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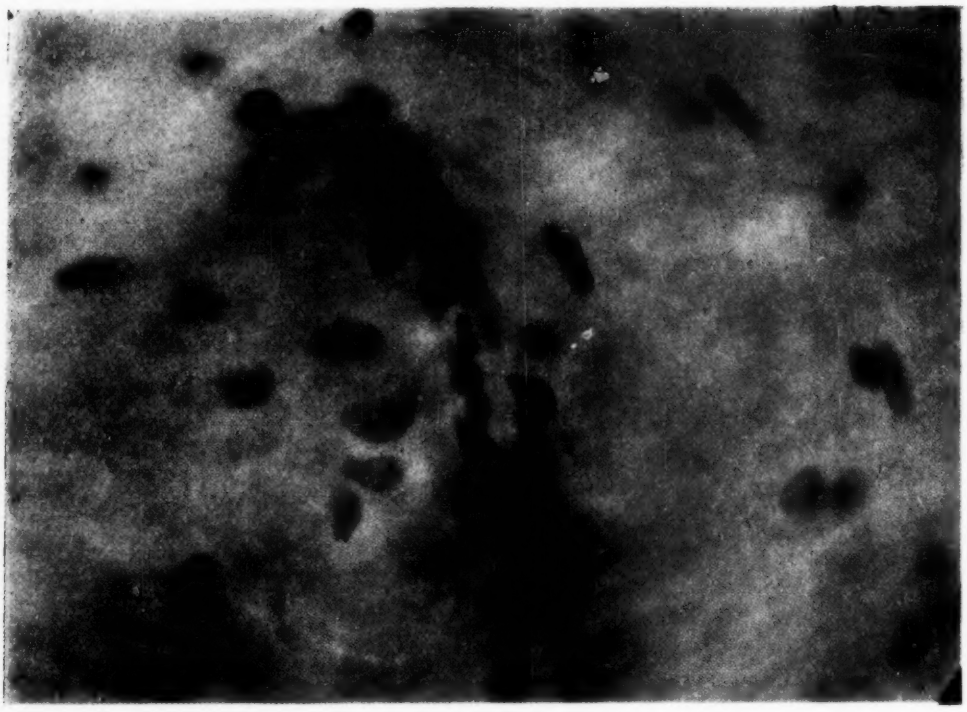

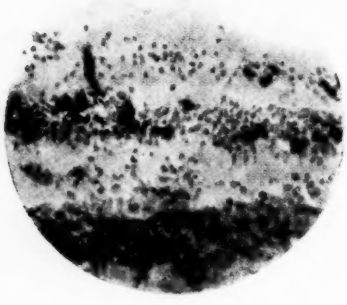

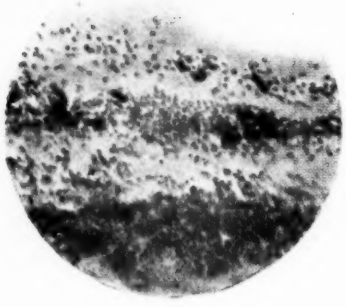

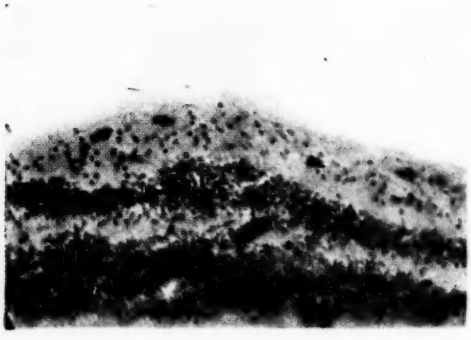

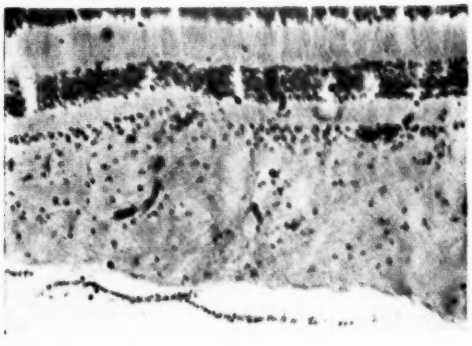

PLATE 1 (FRITZ AND HOGAN). FAT EMBOLI ARE SHOWN IN THE RETINAL VESSELS BY THE USE OF SUDAN-IV STAIN

AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 31 MAY, 1948 NUMBER 5

FAT EMBOLIZATION INVOLVING THE HUMAN EYE*

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New York
AND
MICHAEL J. HOGAN, M.D.‡
San Francisco, California

Prior to 1862 it had been surmised that fat embolism might follow injuries to the long bones or soft tissues. In that year, Zenker reported the first case of fat embolism in man. Since that time a fair number of case reports and studies of the condition have appeared in the literature.

ETIOLOGY OF FAT EMBOLISM

By far the greatest number of cases of fat embolism have followed injuries to the bones or soft parts of the body. Vance groups the factors causing this condition as follows:

1. Traumatic
   - A. To bones
     - (1) Fractures
     - (2) Jarring of bones
     - (3) Orthopedic operations
   - B. To soft parts
     - (1) Injury to subcutaneous fat
     - (2) Injury to fatty viscera
     - (3) Burns
2. Nontraumatic (dubious)
   - A. Diabetes
   - B. Childbirth
   - C. Injection of oily substances

The largest number of instances of this condition followed fractures of the long bones, particularly those of the lower extremities. Cases have been reported, however, following concussion of the bones, with liberation of fat into the circulation. Cases have been reported following manipulation of old contracted rheumatoid joints or other orthopedic operations such as osteotomies or excision of joints.

MECHANISM OF PRODUCTION OF EMBOLI

Depot fat is found in the subcutaneous tissues, omentum, viscera, and in the bone marrow. The fat in these various structures is stored within the confines of large cells. The marrow fat is the source of most emboli and may be liberated from the cells by direct rupture as in a fracture or by concussion from a blow. The vessels in the bones are held within the rigid Haversian canals and do not readily collapse following the injury. The liberated fat enters these torn vessels during or following the injury. This fat passes through the venous system to the right side of the heart and pulmonary circulation where fine emboli lodge in the capillaries of the lungs. Some of these capillaries may rupture, liberating fat into the alveoli, accounting for the fatty sputum which is occasionally noted. Some of the fat may pass through into the general circulation and result in systemic emboli. Fat may also be excreted by the kidneys, without the development of renal

* Part of the expenses connected with this research was met by the Florence Ellsworth Wilson Memorial Fund Fellowship in Ophthalmology.

† From the Eye-Bank Laboratory, New York, New York.

‡ From the Proctor Foundation for Ophthalmic Research and the Division of Ophthalmology, University of California Medical School.

damage. This accounts for the fat which is seen in the urine in many of these cases.

Symptoms and Signs

There are two main forms of the disease which may be encountered:

1. Pulmonary. The clinical symptoms in the pulmonary form may be of two types. The first develops soon after the injury and the symptoms are of acute and rapidly progressive pulmonary failure and are due to a massive flooding of the lungs with fat. The second type is more common and commences on the third or fourth day after the injury.

2. Systemic. The symptoms in this form depend on passage of fat to the various organs of the body after leaving the pulmonary system. In general the frequently involved portion of the body is the central nervous system. Restlessness, excitement, delirium, convulsions, and coma are frequently noted in this order. The skin may show petechiae; fat may pass into the urine through the renal glomeruli. Death may occur in from 2 to 6 days.

Ocular findings

A search of the literature shows only one case report which deals with the ocular findings (Evans). In this case a man, aged 23 years, was injured in a road accident. Twenty-four hours later the patient became drowsy. On examination he showed contusions, a fractured right tibia and fibula, right patella and right ulna. All fractures were set under ether anesthesia following admission to the hospital. Forty-eight hours after the injury, the patient was excited and developed incontinence of urine. He showed petechiae on the chest and neck, a slight squint of the left eye, and fat in the urine. Four days after the injury the fundi were examined and showed diffuse edema of the whole posterior pole, especially the macular regions. There were three crescentic areas of intensified pallor near the right macula. In the right eye there were two large subhyaloid hemorrhages, temporal and below the macula. In the left eye there was one smaller hemorrhage in the periphery. The ocular blood vessels appeared normal. Fifteen days after the injury the patient was much better and was able to read. The fundi showed less edema. Two months after the injury, the vision was 20/20 in each eye, and there was still a small remnant of the subhyaloid hemorrhage in the right eye but the left fundus appeared normal.

Because of the paucity of information in the literature concerning the ocular complications of generalized fat embolization and because the ophthalmoscopic and ocular histopathologic changes were so clearly and unequivocally observed in a typical case, it was deemed worthwhile to draw up a complete case report.

Case report

A 21-year-old soldier was admitted to the emergency room about 8:30 a.m. (Eastern war time), June 27, 1945, in shock.

History. At about 7:50 a.m., June 27, 1945, while the patient was on duty in the forward galley of a tug boat at the Boat Squadron Dock, a gasoline stove had exploded from an unknown cause and the concussion of the explosion had caused the following injuries:

1. Fracture, compound, complete, both tibias and fibulas, mid-third.
2. Fracture, simple, complete, medial malleolus, right tibia.
3. Fracture, simple, complete, posterior lip, left tibia.
4. Fracture, 9th rib posteriorly, right side, and 1st rib, left side.
5. Fracture, 1st sacral segment, simple, incomplete.
6. Wound, lacerated, parietal region of skull.
7. Hematuria, origin undetermined.
8. Shock traumatic; B.P. 40/15 mm. Hg.

Examination. At 8:40 a.m., the blood pressure was 120/80 mm. Hg. A 500-cc. transfusion of plasma was started immediately after admission. The pulse was in the range

of 84 to 88. Complete blood studies were ordered, including hematocrit, and the patient was immediately typed for blood transfusion. From 8:55 to 11:00 a.m., the blood pressure range was 115 to 130/75 mm. Hg. He was then given 500 cc. of whole blood.

After the patient's condition became stabilized, splints were applied to both legs. The patient was conscious and oriented at all times and discussed the accident quite freely.

X-ray films of the legs, pelvis, and chest were made, and the possibility of a head injury was kept constantly in mind. At no time were there any neurologic findings to indicate such an injury.

The patient was catheterized, for there was the possibility of a genito-urinary tract involvement, and bloody urine was obtained. A cystogram was obtained and showed no evidence of rupture of the bladder. The abdomen was soft. There was no pain nor tenderness over the kidney regions. The chest was clear, and at that time there was no evidence of a blast injury.

During observation and study, from 8:30 a.m. to 1 p.m., it was the opinion of the surgical department that this patient could be operated upon, the fractures reduced, and alignment maintained. At time of operation, red blood-cell count was 4,230,000; hematocrit, 40; and blood pressure, 108/80 mm. Hg.

Operation. Under ether and oxygen anesthesia, the legs were thoroughly scrubbed with soap and water, shaved, and alcohol and tincture of merthiolate applied. The wounds were debrided. The left tibia was united with transfixion screws, and the right tibia with transfixion screws and a 4-screw plate. During the operation, the patient received glucose, blood, and normal saline intravenously. He lost considerable fluid on the table. After fixation, casts were applied and the patient was returned to bed.

At 11 p.m., the patient was seen by the orthopedic department, and at that time he had recovered from anesthesia; the blood pressure was 116/80 mm. Hg; pulse, 116. He was talking about the accident, and his postoperative condition was good.

Course. He was next seen at 8 a.m., June 28, 1945. There was a very marked change in his condition. He was unconscious and reacted sluggishly to stimulation. There was very slight pupillary response to light, flaccid paralysis of the arms, and the temperature was 102.5°F.; blood pressure, 108/70 mm. Hg; respiration, 30; pulse, 130. Again the question came up as to the presence of head injury. The unconsciousness, the slight response to stimuli, and paralysis were all suggestive of a head injury. Acidosis, pulmonary edema, and secondary shock were considered.

Coma continued until time of death. Complete blood chemistry examination revealed no explanation for the coma. A spinal tap was done, and was grossly clear. Clinically there were no signs of increased intracranial pressure.

Eye examination. Ophthalmologic consultation on the same day revealed the pupils to be round and equal in size. They reacted briskly to light. Under homatropine mydriasis, the fundi showed round and oval, white, subretinal exudates completely surrounding both maculas and following the course of the main retinal vessels. There were no hemorrhages. The macula in the right eye appeared cherry red. Diagnosis was: (1) Multiple fat emboli of the retinal vessels. (2) Edema of the retina secondary to the embolism of the vessels.

Diagnosis. From the accumulated data, a diagnosis of fat embolism was based upon the following considerations: (1) Presence of fat in urine. (2) Coma in a man with multiple fractures. (3) Coma in a man without signs of increased intracranial pressure. (4) Eye-ground examination which showed embolic phenomena involving the retinal vessels. (5) Multiple petechial hemorrhages of skin and conjunctiva. (6) Chest films had a cotton ball appearance in the parenchyma of the lungs.

Later the same day the patient was seen

by Lieut. Col. Phillips Thygeson and Lieut. Col. S. Rodman Irvine, who wrote: "Media clear. Edema and exudates both fundi, more marked in right. Discs appear normal. No actual fat emboli seen but appearance of retinas suggest an embolic phenomenon involving central vessels."

On June 29th, the ophthalmologic note read: "There are multiple conjunctival petechiae in both eyes. Eyegrounds show no hemorrhages. Exudates increased in number in left eye. They are along vessels which appear quite normal."

The ophthalmologic note on July 3rd read as follows: "Cotton wool would best describe the exudates now. There are more of them along the vessels on the left and in one of them is a hemorrhagic area. On the right there are now many white exudates on both sides of the disc. The cherry red macula in the right eye persists."

About two days after admission, the patient had X-ray evidence of pneumonia in the right lower lobe. He was treated by oxygen, intravenous glucose and saline, multiple blood transfusions, intravenous vitamins, and concentrated albumen. He was also given penicillin intramuscularly in large doses, and from the 2nd to the 5th postoperative day, he was given 5 gm. of sodium sulfadiazine daily.

The patient at no time came out of his comatose state, and the course was gradually downhill. He developed an acute pulmonary edema, which disappeared on the sixth postoperative day after the administration of 100 cc. of concentrated albumen. Previous to this time, the man had been given concentrated glucose, atropine, and frequent tracheal aspirations. At times as much as 200 cc. of fluid would be obtained in one tracheal aspiration. Fat was never obtained in the sputum. Blood chemistry was relatively normal except for the blood chlorides, which were elevated on two successive days. This was taken care of by discontinuing the administration of intravenous saline. The red count ranged between three and four million.

The patient died on the 10th postoperative day, July 6, 1945, at 2:05 p.m.

General pathologic report

The following notes are all that have been found of the general pathology protocol. Scharlach-R stain was used.

Brain. Fat stain of the brain shows many capillaries plugged with fat emboli. Surrounding many of these emboli are seen focal areas of necrosis not associated with hemorrhage. There is seen in various portions of the section what appears to be free fat globules within the parenchyma and here and there early phagocytosis of the lipoid material is in progress.

Myocardium. Microscopic section of the myocardium shows nothing of note.

Lungs. Microscopic section of the lungs shows many of the alveolar spaces filled with polymorphonuclear leukocytes. The bronchioles are filled with purulent material. Many large phagocytes filled with brown-staining material are seen. Fat emboli can be demonstrated within the lung tissue. There is considerable hemorrhage within the alveolar spaces surrounding these emboli.

Liver. Microscopic section of the liver shows normal configuration of the liver lobules. The cytoplasm of hepatic cells is somewhat granular. Scharlach-R stain shows an occasional large droplet of fat within the sinusoids.

Spleen. Microscopic section of the spleen shows engorgement of the sinusoids.

Kidneys. Microscopic section of the kidneys shows many of the glomeruli in the H.-&-E. stain to contain what appears to be large clear spaces. Scharlach-R stain reveals that these areas are fat globules filling the capillaries.

Diagnosis. (1) Fat embolism (generalized fat embolization). (2) Pneumonia, terminal.

Ocular pathologic report

Gross examination

(Dr. Hogan, made this report.) Calottes had been removed from both eyes prior to

their reception at the laboratory. The specimens had been embedded in gelatin blocks and preserved in 10-percent formalin. It was not possible to identify the eyes as to whether they were right or left eyes or to render a gross description of the specimens.

Fig. 1 (Fritz and Hogan). Hemorrhage in the inner retinal layers (Sudan IV).

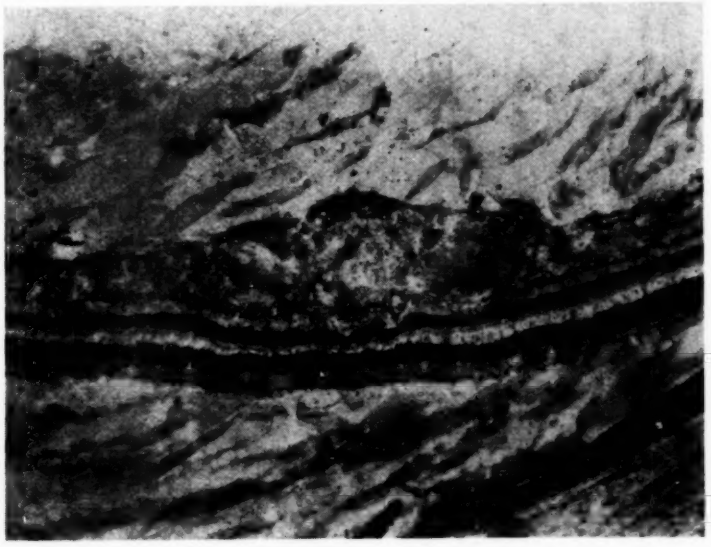

Fig. 2 (Fritz and Hogan). Focal area of retinitis. Note fat-filled capillaries at periphery of lesion (Sudan IV).

Technique

Frozen sections of the gelatin blocks of the embedded eyes were made with the freezing microtome. The cut sections were stored in distilled water containing a small amount of 10-percent formalin. The best sections were selected and stained with Sudan IV for fat. The stained sections were mounted on slides in a solution of either gum arabic or glycerin under glass cover slips. The cover slips were rimmed with paraffin or concentrated nitrocellulose to prevent drying.

Microscopic description

Cornea. The epithelium shows some atrophy and slight postmortem degeneration.

Limbus. Schlemm's canal is open and the

trabecular meshwork contains some clumps of dark uveal pigment.

Sclera. The sclera shows small, scattered globules of fat on the surface, but not in conjunction with any of the blood vessels.

Choroid. The posterior choroid, adjacent to the optic disc, shows several vessels just beneath the choriocapillaris which contain

Fig. 3 (Fritz and Hogan). Capillary fat emboli in inner retina (Sudan IV).

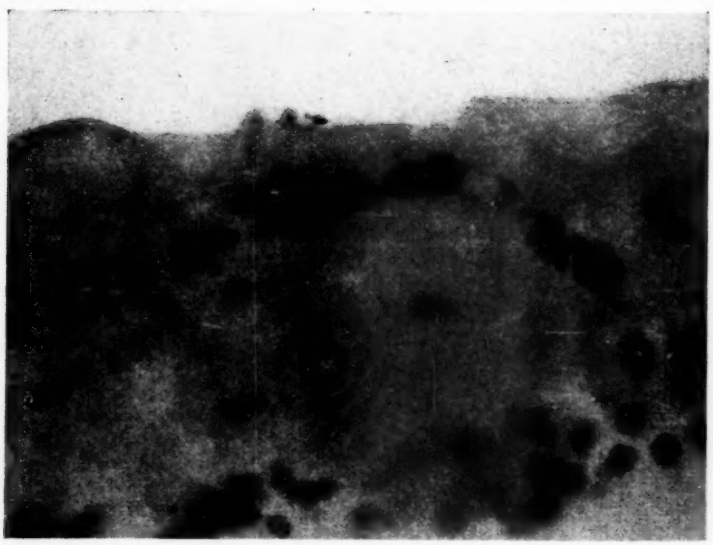

Fig. 4 (Fritz and Hogan). Embolus in retinal capillary (Sudan IV).

Anterior Chamber. There are several large dark clumps of uveal pigment in the angle.

Iris. The iris shows heavy pigmentation, but does not appear to be inflamed.

Ciliary Body. The stroma and processes show light diffuse edema and round-cell infiltration. Several small capillaries in the longitudinal portion of the ciliary muscle show fat emboli.

fat emboli. The stroma around these vessels is chronically inflamed.

Retina. The principal changes in this eye have occurred in the retina, posterior to the equator. The temporal portion of the retina seems to be most affected, and there are extensive changes in the macula. The nerve-

fiber, ganglion-cell, and inner-plexiform layers are most severely affected. The following changes are noted in these areas: (1) Scattered, fine circumscribed hemorrhages in the nerve-fiber and ganglion-cell areas the capillaries have ruptured and fat lies loose in the retinal stroma. (3) Scattered capillaries in the nerve-fiber, ganglion-cell, and inner-plexiform layers throughout the retina show small fat emboli (figs. 3, 4, 5,

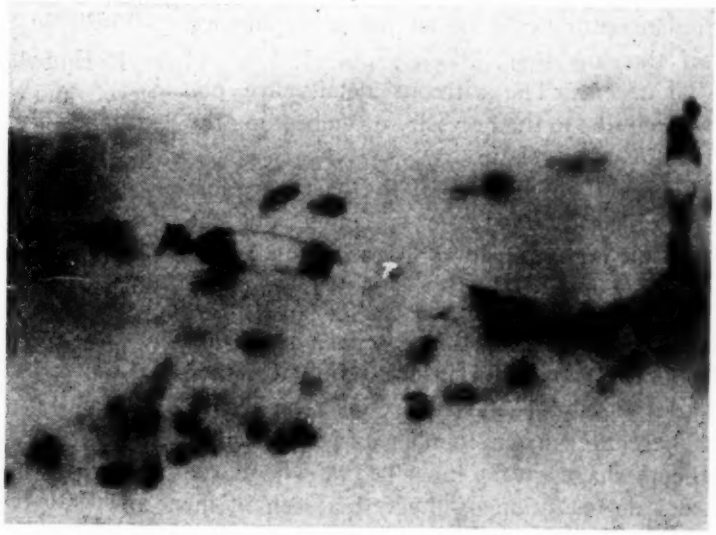

Fig. 5 (Fritz and Hogan). Fat embolus in retinal capillary (Sudan IV).

Fig. 6 (Fritz and Hogan). Embolus in retinal capillary (Sudan IV).

layers. (2) Focal areas of edema, hemorrhage, chronic inflammation, and secondary degeneration are seen in the inner portion of the retina (fig. 1). In and around these areas, the terminal retinal arterioles and capillaries are dilated and contain fat emboli which stain with Sudan IV (fig. 2). In some and 6). Some of these vessels show perivascular round-cell infiltration. (4) In several areas, the inner limiting membrane shows interruptions and a fine fibrinous exudate fills the gap and lines the inner retinal surface.

Optic Nerve. The disc appears somewhat

edematous, especially at the nasal and temporal borders. A number of capillaries in various sections show fat emboli. There are a number of small circumscribed hemorrhages on the disc, especially in the nerve-fiber layer on the nasal side. A few chronic inflammatory cells lie on the inner surface of the cup.

Vitreous. The vitreous details are obscured due to the necessity of embedding the specimen in gelatin.

Lens. The contents of the lens were lost in preparation of the specimen, but the capsule and epithelium appear normal.

Comment

The sections of this specimen show undoubted fat emboli in the terminal retinal arterioles and in the retinal capillaries. There are also a number of small retinal hemorrhages in the inner layers. The edema and degeneration of the retina seen in the areas of these emboli probably result from a lack of nutrition caused by blockage of the vessels. It is interesting that the larger retinal and optic-nerve vessels show no emboli.

The changes seen in the second specimen are identical with those reported in the above eye so it is not necessary to duplicate the description. In general the findings in the retina in this eye are not as severe as those seen in the fellow eye.

Diagnosis

1. Embolism, fat, retina, choroid, optic nerve, and ciliary body.
2. Retinitis, secondary to fat embolization.

210 East 64th Street (21).
University of California Medical Center (22).

The authors' thanks are due to the following individuals without whose coöperation the reporting of this case would not have been possible.

Lieut. Col. Coy S. Stone (MC), Chief of the Surgical Service, Station Hospital, MacDill Field, Tampa 8, Florida, gave the authors the opportunity of making the diagnosis and observing the eye grounds during the life of the patient.

Miss Madeline Banton, secretary to Colonel Stone, assembled records that seemed irretrievably lost in the confusion following the rapid changes of personnel after capitulation of the Japanese.

Capt. Millard B. White (MC), pathologist of the Station Hospital, contributed the protocols and made the sections of the thoracic organs, the abdominal organs, and the brain.

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THE TEACHING OF OPHTHALMOLOGY*

The Harry S. Gradle Lecture

Derrick Vail, M.D.
Chicago, Illinois

We sincerely regret that Prof. Harry S. Gradle is not here with us, either to give this, the first Gradle Lecture, in person, or to hear its presentation. It is our great loss for Dr. Gradle, more than any other individual in the United States, thought more about and did more to stimulate the teaching of ophthalmology.

It was his genius that helped to develop the instruction courses that are so important in the life of the American Academy of Ophthalmology and Otolaryngology and its members, and it was he who conceived and executed the Home Study Courses in Ophthalmology that have guided and will continue to guide the early thinking and steadfast study habits of a neophyte ophthalmologist. He has written and talked much and thought deeply about all the phases of the teaching of our great specialty.

Shortly before his retirement, because of ill health, from the activities and the group of colleagues whom he loves, he was engaged in a plan to integrate all the ophthalmic facilities of Chicago and to form a continuous postgraduate course of ophthalmology, open the year around to any qualified physician, and covering every subject embracing the broad field of ophthalmology. It is the hope and ambition of the members of the Chicago Ophthalmological Society to carry out this plan to a successful conclusion. Alas, his genius and help are no longer available to us, and it will take much time and skill to come near to his expectations.

* Presented at the III Pan-American Congress of Ophthalmology, Havana, Cuba, January 7, 1948. From the Department of Ophthalmology, Northwestern University Medical School.

Teaching is responsibility

It is with considerable disquiet that I have accepted the invitation, and the great honor it imposes, to give the Harry S. Gradle Lecture, because until very recently my endeavors in the field of ophthalmic education have been limited and my outlook and experiences are just beginning to unfold. Yet the teaching of ophthalmology is a subject that is of the utmost importance to men and women everywhere and of the deepest significance to society. Eyesight is the greatest gift to mankind, and it is our chosen responsibility to endeavor to preserve, maintain, and restore, where necessary, the use of this priceless gift. The teaching of ophthalmology is a part of this grave responsibility and we will not have fulfilled our destiny until each one of us has added a bit to the pool of knowledge or has passed down parts of it to those who are to succeed us.

The teaching of ophthalmology entails a discipline similar to that of any other medical specialty, although the field that is covered is broader than most of them. Our material is the young physician, who has just completed his interneship, or the older physician, who wishes to take up the study and practice of ophthalmology either as a part of his practice or as the whole. But the seeds of our teaching should be planted earlier than this, in the minds of the undergraduate medical student and in some favorable cases by a postnatal approach, as those of us who have been lucky enough to have ophthalmologic fathers, and there are many such, can testify. Fortunate, indeed, are those individuals who have been exposed from the cradle on to the intellectual and

stimulating environment of ophthalmology and have grown up into the specialty as a natural birthright. Harry S. Gradle is one of these, and he is a great credit to a great father.

Qualifications of ophthalmologist

Our raw material must be of first rate quality. The individual seeking to make a success of the practice of ophthalmology must possess keen vision, excellent color discrimination, a steady hand, a courageous heart, sympathy and understanding and love for man. He must have a definite artistic temperament, a somewhat feminine quality of intuition, and he must be a perfectionist. He must have a high sense of duty, a conscience that pricks but does not stultify, and a masculine boldness that is at its best in emergency. He should be able to draw straight and curved lines with a pencil or knife. He should be interested in medicine and surgery, physics, optics, physiology, chemistry, and psychiatry. He should be a student of anatomy, embryology, and pathology.

The teacher should be an experienced clinician or laboratory worker, or both, with unquestioned intellectual integrity. He must be patient and sympathetic, logical, tireless, and efficient. But above all he must be interested in teaching, adaptable to new trends and situations, and eager to seize upon all tried methods of getting his subject across the barrier of his and his student's mind. Unfortunately, there are not enough of such individuals thus described, either teacher or student. But the ideal is there and it should ever be before us.

Facilities for teaching

On the whole, the physical plants and facilities for the teaching of ophthalmology throughout Pan America leave much to be desired. There are only a relatively few adequate places with ideal surroundings where ideal teaching to ideal students can be carried out. Yet if the instinct and urge, the wish and the ability are in the heart of a teacher, the student can learn even if there be nothing but a log for the two to sit upon, and sand upon which to draw the necessary diagrams. So, in the last analysis, it all comes down to the quality of the men, teacher and pupil.

Let us see how an individual, wishing to become one, develops into an ophthalmologist. These are the steps: (1) Undergraduate teaching, (2) graduate teaching, and (3) postgraduate teaching.

Undergraduate teaching

A recent study by a committee of the American Academy of Ophthalmology and Otolaryngology embraced an investigation of the curriculum of undergraduate ophthalmology in every medical school in the United States. Many interesting facts were disclosed upon which suitable recommendations to medical schools could be made.

There was a wide variation in the hours allotted, the subjects covered, and the methods of instruction. Some of the schools with great reputations were weak and others of lesser caliber were strong in this department. In some, the methods of instruction that were used were casual and haphazard, in others thoughtful and meticulous. The total number of hours varied from 24 to 118, the average being about 53 hours given to the undergraduate teaching of ophthalmology. The complete report of this committee is appended hereto. It rightly forms an essential part of this presentation.

*Report of the Committee on Undergraduate Instruction in Ophthalmology to the Council of the American Academy of Ophthalmology and Otolaryngology. October, 1947.**

The Committee on Undergraduate Instruction in Ophthalmology sent questionnaires to the ophthalmology department heads of 40 of the leading medical schools of the country. Replies were received from 37 regarding the amount and nature of the teaching given in their respective institutions. Appreciation is expressed by the committee for this coöperation since the ques-

* Published in the *Transactions of the American Academy of Ophthalmology and Otolaryngology*, Nov.-Dec., 1947, pp. 134-135.

tionnaire was somewhat long and involved. These replies were analyzed and carefully considered. Based on a study of them, the following outline is presented as a model for undergraduate teaching of ophthalmology. The committee realizes that modifications must be made by individual schools depending on available personnel and facilities and it is not their intention to present an exact outline, but rather to define in general terms certain goals that are considered desirable.

Outline for the Teaching of Ophthalmology to Undergraduate Medical Students. The anatomy and physiology of the eye may best be given as a part of the respective courses in the departments of anatomy and physiology. It is suggested that the services of the department of ophthalmology should be utilized in the presentation of these subjects.

The anatomy and physiology of the eye including physiologic optics might well occupy 20 to 24 hours, being approximately equally divided between the two subjects.

In the regular course of pathology one or two hours toward the end of the course should be devoted to the study of eye pathology. Here also the help of the department of ophthalomology might advantageously be utilized.

At the beginning of clinical instruction the student should be assigned to the department of ophthalmology for indoctrination in the use of ophthalmic diagnostic instruments for a period of from four to eight hours. This would include instruction in ophthalmoscopy, perimetry, external examination, the use of oblique illumination, the taking of vision, the gross examination of ocular motility, but no consideration given to the technique of refraction.

In the department of ophthalmology a minimum of 40 hours and a maximum of 60 hours should be required. Of this 20 percent to 40 percent may well be didactic and 60 percent to 80 percent clinical.

Didactic Instruction. The bulk of the didactic teaching should precede the clinical instruction in ophthalmology. The didactic teaching should be largely devoted to the relationship of ophthalmology and general medicine and to a study of the most important eye diseases met with in the general practice of medicine. To this end it is suggested that the first one or two lectures only be devoted to a review of the anatomy and physiology of the eye; a third lecture be on asthenopia and disturbances of ocular motility; a fourth on important eye diseases requiring differential diagnosis, such as conjunctivitis, keratitis, and uveitis, with special emphasis on glaucoma. All the remaining lectures, which therefore constitute a majority of the course, should be devoted to the various phases of medical ophthalmology. Under this head should be included such subjects as ocular manifestations of systemic diseases, syphilis, tuberculosis, diabetes, malignancies, blood dyscrasias, and vascular disease. Also the important subject of neuro-ophthalmology, including optic neuropathies and the ocular manifestations produced by intracranial lesions, should be considered. It is considered important that lectures should not slavishly follow textbooks, but should exceed the usual brief and relatively uninspiring textbook approach.

The use of visual aids to supplement teaching should be extensively employed.

Certain "don'ts" for the didactic course seem worthy of special mention, namely:

1. Do not discuss the technique of refraction.
2. Do not spend important time on the diagnosis of muscle anomalies.
3. Do not consider medical and ophthalmologic curiosities.

Clinical Instruction. Subjects in so far as possible should illustrate the material presented in the didactic lectures. Effective clinical teaching can be given only to small groups of students. Direct observation of surgery is of doubtful value. The salient points can be adequately covered with motion pictures. If surgical demonstrations are to be given, they should be confined to a few typical examples of common operations. The opportunity to observe operations may be offered as an elective.

History taking and actual examination of the patient by the student is an important feature and the student's work should be reviewed by the instructor. During this period of clinical instruction proper emphasis should be placed on the technique of the examination.

Since ophthalmology is a required course, an examination should be given at its termination.

Every student should be required to own his own ophthalmoscope and a suitable textbook.

It is urged that the departments of medicine, obstetrics, pediatrics, and neurosurgery require that an ophthalmoscopic record be made of each student on the patients assigned to him.

In so far as possible, elective courses in ophthalmology should be offered by the department. (Signed) Lawrence T. Post, M.D., *Chairman;* Edwin B. Dunphy, M.D., Derrick Vail, M.D., and Alan C. Woods, M.D.

Comment

The purpose of a good course in ophthalmology to the undergraduate medical student should be (1) to introduce him to an important and fascinating field of medicine, (2) to teach him ophthalmoscopy and the relationship between the eye and general diseases, (3) to teach him to recognize and diagnose the mutilating eye diseases that are likely to be encountered—such as glaucoma, iritis, conjunctivitis, and cataract—by any practicing physician, and (4) to teach him

the importance of consulting with the expert ophthalmologist who will be of great help to him and to his patient and who will gain his respect. The undergraduate course should not include refraction, ophthalmic surgery, and the various techniques of advanced study.

Graduate teaching

By graduate training I mean that obtained through residencies or preceptorship. It does not, nor should it, include short courses here and there. It is in this phase that the sincere, earnest, and talented young physician obtains his foundation of ophthalmic knowledge and practice, upon which his entire career rests and his integrity and intellectual honesty depend. There is a trend, and I think it is a wise one, for the development of special basic courses in ophthalmology to follow the interneship and to precede the residency.

Curriculum of training

This preresidential course embraces ophthalmic anatomy, histology, embryology, and pathology, optics, visual physiology, and principles of refraction. It includes the instrumentation and techniques of examination, such as inspection, observation, and notation, slitlamp biomicroscopy, tonometry, perimetry, gonioscopy, and especially ophthalmoscopy. The principles and care of the instruments are taught.

Emphasis is also given to biochemistry as it pertains to the eye, pharmacology and therapeutics, neuroanatomy, neurophysiology and neuro-ophthalmology, bacteriology, serology, and toxicology. Such miscellaneous topics as heredity, ophthalmic psychiatry, occupational or industrial ophthalmology, and so on, are essential parts.

A satisfactory basic course must cover, as far and as widely as possible, ophthalmology as it pertains to general medicine, for we are physicians first and ophthalmologists second.

Length of course

The length of such a course varies from place to place depending upon the talents and skills of the members of the faculty and on the physical facilities and equipment that are available.

A basic course without any clinical inclusion can be given adequately in four months. Clinical experience, enough at least to permit the graduate student to exercise the things that he has learned in the classroom, is desirable, but it prolongs the course six to nine months. This is not a misfortune for in the short course scarcely enough time is allowed for the student to digest and absorb the material that is presented to him.

The danger of a longer basic course is that the student considers, in some cases, that he has had enough training and will go out into practice without further to do.

At the moment this may be perplexing to the director of such a course, for as Prof. Alan C. Woods of Johns Hopkins has said, "There are a great number of poorly trained and educated men who have completed their military service, are dissatisfied with their former medical practice, and now take the opportunity offered by the G. I. Bill of Rights to enter a specialty which they correctly believe to be lucrative and erroneously believe to be easy. The great majority of this group are poor material and even under normal conditions would have great difficulty in obtaining hospital appointments. Under present conditions their chances of doing so are minimal."

Dr. Woods goes on to say, "I feel strongly that admittance to such basic courses should be limited to men who have either obtained their ophthalmological interneships or who have fair prospects of ultimately being properly placed."

Basic courses, therefore, no matter how long, should under no circumstances be considered as the final step in the training of an ophthalmologist.

When course should be given

There is too, at the moment, a controversy as to whether such a basic course should be given prior to or during the ophthalmic residency. There are excellent arguments to both sides, but I believe that, if some clinical work can be given along with the basic studies, the student is in a much better position to appreciate the residency training. It might be arranged, in addition, to give the resident about to graduate, a quick review in basic subjects.

Unfortunately, there are not enough residencies in the United States to take care of the demand and many a well-trained basic student has had to undertake a preceptorship of several years' duration. The final value of a preceptorship depends on the ability of the preceptor and the opportunity presented to the student to learn. Thus one can see that there is an enormous variation in the quality of the preceptorship between very bad conditions, even exploitation, on the one hand, to a glorious opportunity under a paternal, experienced, and loving hand of guidance on the other.

Residency training

Residency training has proved, in all fields of medicine, to be the best method of educating the physician, and it is especially so for the ophthalmologist. Whether it should be for two or three years' duration is a debatable point, but there comes a time when the young ophthalmologist must leave the nest and go on his own. The director of the department, jealous of his school or hospital, is usually pretty particular whom he chooses as resident and will see to it that the young man measures up to the highest principles and ideals. During the residency, the young ophthalmologist is expected to know his cases intimately; to read, study, and review the literature; and toward the end of his stay, he is usually encouraged to do a bit of research or to write a paper. He frequently takes some modest part in the teaching program, if there is one, of his hospital, and attends the local medical society meetings and staff conferences. His time is shared between hospital and outpatient work, and if he is fortunate and skillful and endowed by nature, he becomes a safe and even expert ophthalmic surgeon by the end of his term.

There are few hospitals in the United States that are equipped to offer residents educational opportunities of university standing. There is a need to tie together in some fashion these hospitals and the nearest university. The same thing applies to the study of the basic sciences, for it is in this important phase of his education that the young ophthalmologist needs guidance in his study schedule and in his study habits. The contact that he makes with the teachers in the basic sciences will lead to a closer union between the clinic and laboratory. It is no doubt difficult to find enough teachers for either the clinical or the basic-science studies. As time goes on, however, the number of residents who graduate will increase, and they should be able to assume much of this work.

Organization of residency

The residency should be organized as a real educational experience provided by qualified teachers who are willing to assume responsibility for adequate instruction. It should be a joint responsibility of medical schools and of those hospitals able to provide residencies of a satisfactory educational character.

A valuable residency should include careful supervision of the resident's work, particularly in his first few months of service. Organized regular ward rounds, with free discussion of the problems encountered and suggestions for their solution, are an essential part of any residency. Clinical conferences and staff meetings, not only those of the ophthalmic staff but also those of the entire hospital staff, must be attended by the ophthalmic resident.

The value of a journal club, with weekly meetings, has been well established. Under the direction of his chief, the senior resident should be given the responsibility for at least a portion of the conferences, seminars, and meetings. Reports, written by the resident, should be insisted upon, in order to develop his ability to organize his facts logically, to present them clearly, and to draw appropriate conclusions. He should be encouraged to speak from notes or memory, and thus develop his powers to speak effectively. It goes without saying that a good ophthalmologic library as part of a medical library should be easily available.

Experience in consultations

Consultations on his own, and particularly on other services, are of the utmost value, and every opportunity must be taken to foster and encourage them. The resident, who, as a future ophthalmologist, will be constantly called in consultation, should learn during his years in the hospital the value of such a consultation and how to conduct himself in meeting the patients and his colleagues. Therefore, he should be present as frequently as possible when his chief is called in consultation; and when he becomes the senior resident on his service, he can become a consultant to other services. When he is not satisfied with his findings, he should call upon his chief for assistance.

Living in a large hospital with other residents, he sleeps, eats, and lives medicine and ophthalmology. He shares in the experiences of the other services and he becomes acquainted with the different ways of doing things by different good men. To my way of thinking, there is no substitute for a good residency in the training of an ophthalmologist.

Postgraduate training

By postgraduate training, I mean that obtained upon completion of residency or preceptorship. It may follow the residency immediately and consist of, for example, a year or more as an assistant to a well-established and older ophthalmologist. Again, the postgraduate student may be a surgical fellow, traveling around from place to place, observing different techniques of different men with time to study, to experiment, to do literary or surgical research; or he may elect to spend some months in a physiological or biochemical laboratory learning methods and gaining experiences that may be useful later; or he may migrate for a space of time for special study in ophthalmic pathology in some great ophthalmic center.

Postgraduate training may come later and sporadically, through short refresher courses, or instructional courses, or through the special societies, such as this great body. Indeed, there is no end of opportunity and more and more of these courses are becoming available. They are of the utmost value to a man's life and career, refreshing his mind and lifting his spirit from the rut of daily practice and the making of money. All of us are here now, in spite of the expense and loss of time, because of that great hunger within us to learn and to experience more and new things that have to do with the work we love.

Technical aids to teaching

I have given much thought to a discussion of the technical helps for the education of an ophthalmologist. Scores of devices, such as moving pictures or films, animated drawings, slides, models—in short all of the contrivances now known as visual aids—are at hand. Sound film, technicolor, and television offer much promise for the future.

Our ophthalmic literature—books, journals, monographs, abstract journals, and so on—is becoming more valuable either directly or through microfilm. Language barriers unfortunately remain, and perhaps more thought should be given to a study of ways and means to overcome this difficulty more effectively. Home-study correspondence courses exercise considerable influence and may play a still more prominent part

not only in the education of the young ophthalmologist, but also as refresher courses for the practicing and older ophthalmologist. The true teacher is ever alert to methods and techniques whereby he can overcome the rather high threshold of resistance to new knowledge, a resistance that is so human in the student, in his colleague, and even in himself.

In the last analysis, however, the teaching of ophthalmology hinges on the character, the personality, the experience, the wisdom, the skill, the integrity, and, above all, the desire and love of teaching that is inherent in the teacher himself. Such teachers are few and far between. Such a teacher is our dear friend and colleague, Harry S. Gradle.

700 North Michigan Avenue (11).

MONOCULAR OPERATION FOR HIGH DIVERGENT STRABISMUS*

L. WEEKERS, M.D.
Liége, Belgium

In high divergent strabismus, the deviating eye is often amblyopic. The patient readily consents to operation upon that eye but he objects to letting the sound eye be treated surgically. That is one of the reasons why a binocular operation, if suggested, is not always accepted. Another reason is that the doctor is sometimes not very encouraging as regards the complete correction of the squint after the operation.

There follows a description of a monocular operation which gives excellent and constant results. We have been using it successfully, with some minor improvements, for the last 20 years.†

The operation consists essentially in temporarily attaching the internal rectus to the external rectus of the same eye. Being maintained in this position for seven days, new adhesions occur between the internal rectus and the sclera. The internal rectus is considerably shortened, and its action greatly increased.

PROCEDURE

Anesthesia. Instill a few drops of cocaine. Inject 1-cc. scurocaine (4 percent) in the orbit, 1 cc. along the internal rectus, and 0.5 cc. behind the tendon of the external rectus. This anesthesia renders the manipulation practically painless.

Step 1. Without incising the conjunctiva, the tendon of the external rectus is seized with forceps. A double thread is passed against the sclera under the tendon, or under the muscle just behind the tendon (fig. 1). It is essential to the success of the operation that this hold be a strong one. The thread is double so that it can bear a strong pull without cutting the tissues (fig. 1).

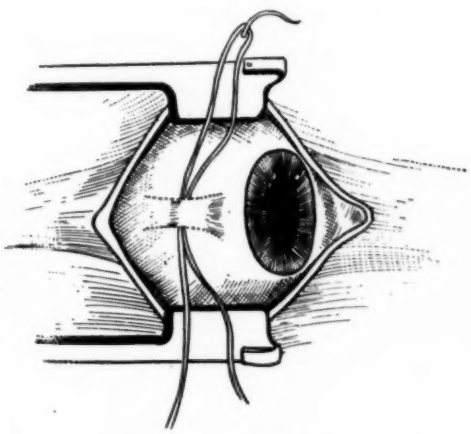

Fig. 1 (Weekers). A double thread is passed against the sclera under the tendon, or under the muscle just behind the tendon.

* From the Ophthalmological Clinic, University of Liége.

† Weekers, L.: Bull. Soc. belge d'Ophth., **78**:43, 1939; Ophthalmologica, **96**:210, 1939.

Step 2. The conjunctiva is dissected along the nasal half of the limbus from the 12- to the 6-o'clock positions. This dissection is carried far back; it must be sufficient to enable a complete covering of the cornea (fig. 2).

Step 3. This step consists in attaching the internal rectus to the dissected conjunctiva.

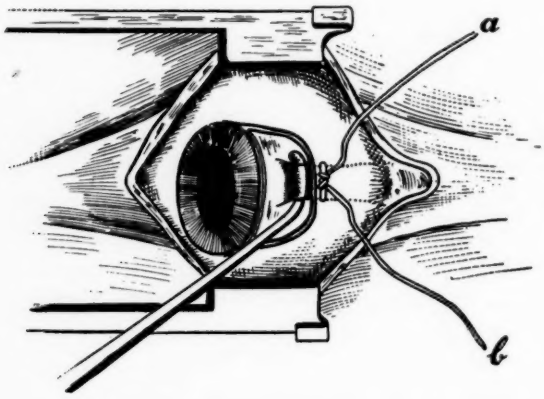

Fig. 2 (Weekers). The conjunctiva is dissected along the nasal half of the limbus from the 12- to the 6-o'clock positions. This dissection must be sufficient to enable a complete covering of the cornea.

A strabismus hook is placed under the tendon of the muscle. A strong silk thread is then passed as follows: (1) Through the conjunctiva, from outside inward, at about 1 mm. from the border, at a point corresponding to the lower edge of the internal rectus; (2) under the muscle; and (3) through the conjunctiva again, from inside outward, at a point corresponding to the upper edge of the muscle. The two ends of the thread are strongly tied. Both conjunctiva and muscle are included in the knot. This device insures a hold which does not risk letting go (fig. 2). The tendon of the muscle is cut with a cataract knife, close to the sclera.

The internal rectus and conjunctiva are severed from the globe and the adhesions which still attach the muscle and Tenon's capsule to the eyeball are cut backward with scissors.

Step 4. The double thread which passes under the external rectus is tied loosely. At that step of the operation, the knot remains unfinished.

Step 5. The thread on the internal rectus has two ends, a and b. One of them (a) is introduced into the loop made by the double thread of the external rectus (fig. 3).

Step 6. The double thread of the external rectus is now tightened further; the thread (a) of the internal rectus is caught but can still slide in the knot. All through this part of the operation, care is taken that the threads cause no trauma to the cornea.

Step 7. Everything is now ready for advancement of the internal rectus. The assistant by means of two forceps seizes the

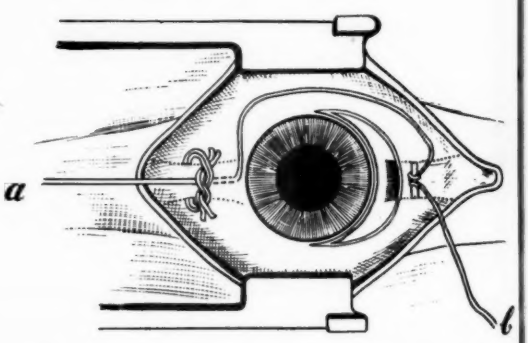

Fig. 3 (Weekers). The thread on the internal rectus has two ends, a and b. One of them (a) is introduced into the loop made by the double thread of the external rectus.

upper and the lower parts of the looped thread around the external rectus. He rotates the eye strongly inwards, carefully avoiding any deviation in height. The operator ties the two ends (a) and (b). The internal rectus and the conjunctiva slide over the cornea. The globe now is strongly convergent, with the cornea completely covered by conjunctiva.

Postoperative care

After the operation, astreptine (p. aminophenylsulfonamidum) in powder form is introduced into the fornix and a binocular

dressing is applied which is to be renewed after four days. It is preferable that the patient remain in bed. Seven days after the operation, the threads are removed on the operating table, under locally instilled anesthesia. The excess conjunctiva and muscle covering the cornea are excised with scissors.

Results

With the technique described above, the shortening of the internal rectus allows a correction of 35 to 40 degrees. Whatever one may fear, the ocular movements postoperatively are in no way limited.

Sometimes the strong tension of the internal rectus causes some enophthalmos, but ultimately this lessens or even disappears.

The cornea withstands the operation without any damage.

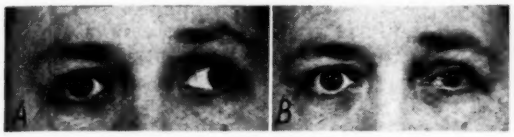

Fig. 4 (Weekers). (A) Divergent strabismus following a tenotomy on the internal rectus of the left eye during childhood. (B) Operation: shortening of the internal rectus of the left eye.

Fig. 5 (Weekers). (A) Divergent strabismus following a tenotomy on the internal rectus of the left eye during childhood. (B) Operation: shortening of the internal rectus of the left eye.

Fig. 6 (Weekers). (A) Divergent strabismus following bilateral tenotomy on the internal rectus during childhood. (B) Operation: shortening of the internal rectus and tenotomy on the external rectus of the left eye.

Fig. 7 (Weekers). (A) Weakness of both internal recti. (B) Operation: shortening of the internal rectus of the left eye.

The operation is indicated in all forms of divergent strabismus (concomitant, paralytic, or others).

The procedure has often given excellent results even in the divergent strabismus

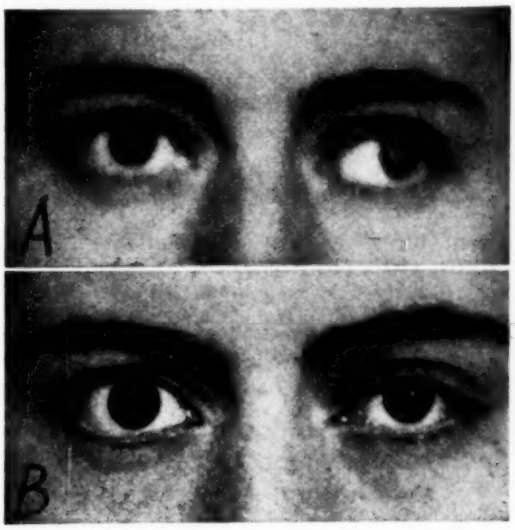

Fig. 8 (Weekers). (A) Weakness of both internal recti. (B) Operation: shortening of the internal rectus and tenotomy of the external rectus of the left eye.

Fig. 9 (Weekers). (A) Divergent strabismus following trauma and loss of vision of the right eye during childhood. (B) Operation: shortening of the internal rectus and tenotomy of the external rectus of the right eye.

Fig. 10 (Weekers). (A) Weakness of both internal recti. (B) Operation: shortening of the internal rectus and tenotomy of the external rectus of the left eye. (C) The abduction of the operated left eye is very satisfactory.

which may follow tenotomy (unilateral or bilateral) of the internal rectus. When in such a case the tenotomized muscle cannot be found, the suture is attached to Tenon's capsule, and the results are as successful as when the muscle itself is sutured.

When the degree of divergence is considerable, and when surgical correction is incomplete, a partial or total tenotomy of the external rectus of the same eye is performed a month later. The tenotomy completes the correction, and it has the advantage of compensating the enophthalmos. Even in such cases, the mobility of the eye is not affected. Tenotomy is performed usually without hospitalizing the patient.

Photographs of patients with divergent strabismus, on whom this surgical procedure was used, are given herewith, showing their appearance before and after the operation.

Summary

The operation outlined consists essentially in provisionally attaching the internal rectus to the external rectus muscle of the same eye. The internal rectus thus forms new attachments to the sclera; it is considerably shortened; and its action is greatly reinforced. If necessary, the correction is completed a month later by a tenotomy of the external rectus.

This procedure is particularly suitable in high degrees of divergent strabismus. One of its great advantages is that it is monocular, and it avoids undependable scleral sutures. The results are excellent and constant.

66, Boulevard de la Constitution.

MILITARY OPHTHALMOLOGY IN THE EUROPEAN THEATER*

DON MARSHALL, M.D.
Kalamazoo, Michigan

WITH DISCUSSIONS BY F. PHINIZY CALHOUN, JR., M.D., AND TRYGVE GUNDERSEN, M.D.

The purpose of this paper is briefly to consider some of the problems of ophthalmology in the ETO, as they were met in a general hospital which was on the scene early and remained through the war in Europe. A comparison of the ophthalmic experience of the 298th General Hospital with that of other ETO medical units, and with those of other theaters, may bring out both generalities and variations of interest and future value.

This paper does not attempt to analyze surgical and therapeutic methods in detail, nor to make a study of the type of missile, location of injury, and resulting structural and visual damage. These problems are being thoroughly and well handled by a number of papers now appearing, based on more complete records than are available to me.[1-3]

Such studies require the time and data available best in an eye center in this country. No man has had opportunity to follow ocular patients from combat to final discharge. Those in the zone of the interior, at the end of the line where the patient and his medical record are before them, have probably had the best opportunity of assessing methods of care and results of injuries.

The 298th General Hospital began receiving patients at Bristol, England, in November, 1942, and continued active there until May, 1944, when it ceased professional work to prepare for the continental invasion. The first general hospital to open on the continent, it took charge of the Marine Hospital at Cherbourg, Normandy, in mid-July after D-Day, working there until the end of October. Late in November it opened a tented hospital on the outskirts of Liége, Belgium, and functioned on that site until the late summer of 1945. Total admissions on all services for the three sites were 35,702 up to June 25, 1945, and the total of all operations was 7,302.

TYPE OF WORK AND PROBLEMS MET

These facts are of importance in considering the type of work and problems met. In common with most general hospitals in England, we served troops who were training and staging for the cross-channel invasion.

WORK AT BRISTOL

Although we began functioning as a hospital at Bristol in November, 1942, no ophthalmology was done until December, when a total of 12 patients were admitted, and 10 outpatients were seen.

All the inpatients at the start were British, arriving by boat from the North African Theater. Nearly half of them were postoperative enucleations, for whom no treatment was necessary. Most of them were transferred on to British hospitals within 48 hours, and no operations were done during the month.

The number of inpatients dropped to a low of three and rose to a peak of 26 during January, due to the rather rapid inflow and transfer of British African casualties, whose ships docked at Bristol.

The outpatient or EENT Clinic Building was not completed and opened until February 20, 1943. It was not until then that refractions and the procurement of spectacles was started. During the next 14 months, work steadily increased as more troops arrived in Britain, despite the opening of additional station and general hospitals.

CHERBOURG HOSPITAL

In Cherbourg we were the only hospital serving that area for many weeks. We were

* Read before the Section on Ophthalmology, American Medical Association, Atlantic City, New Jersey, June 13, 1947.

50 miles from the line of combat, and soldiers injured at the front were evacuated almost invariably direct to England. We saw few of them but were hardly able to keep up with the rush of injured and ill from among the many thousands of troops and prisoners-of-war stationed on the peninsula.

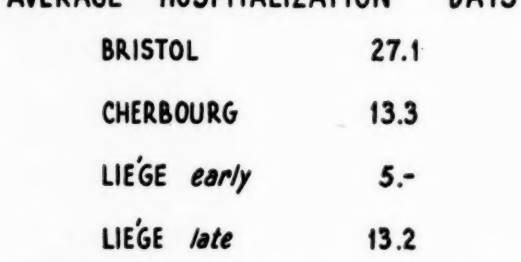

Fig. 1. (Marshall). Average hospitalization of ophthalmic inpatients.

This rush was particularly true of the outpatient clinic. Our appointments for refractions often ran a week in advance. There were many dispensaries in the area, but few medical officers would venture to handle even the simplest of ocular conditions, and they were not expected to carry out the special examinations for refractions and physicals.

Many a G. I. in that period wanted, and was even urged, to join the paratroopers. Such men came in by the dozen for the physical examination that was part of their application form. It bothered us a little to have to spend so much of our time on healthy men when we had come to France expecting to take care of the wounded. We functioned at Cherbourg as a station and general hospital for over three months.

Liége circumstances

In Liége circumstances differed again. With the five other general hospitals in the city we received combat injured from our section of the front, which was an hour away in November, 1944, and only 14 miles away in mid-December at the height of the Battle of the Bulge. At year's end we were averaging nearly 40 outpatient visits a day, including our ambulatory inpatients. Inpatients, injured in combat, poured in, many of them with other wounds, many of them remaining only until they could take the next jump to the rear. Those with minor injuries could often be healed and returned to duty direct. Our hospital, because of its location nearest to the airport, was designated a holding and evacuation unit for patients being sent by air from all other Liége hospitals. This last meant a tremendous flow of patients who stayed with us from a few minutes to several days, depending on how soon the next squadron of C47's came in to get them for transport to England or to western France.

Variations in work

During three years our work varied from that expected of a general hospital to that of an evacuation hospital. The treatment and handling of patients changed greatly with the current holding or evacuation policy.

At one extreme, at Bristol, nearly every case except progressive incurable conditions was made as fit for duty as he ever could be at our hospital, since we could keep him under treatment for as long as 180 days.

TOTAL IN-PATIENTS

	U.S.	BRITISH	CIVILIAN	GERMAN	TOTAL
BRISTOL (1 YEAR, 6 MONTHS)	127	36	1	1	165
CHERBOURG (3 MONTHS)	76	2	2	6	86
LIÉGE (7 MONTHS)	358	1	1	8	368

Fig. 2 (Marshall). Total inpatients.

At the other extreme, during the winter in Liége, we were required to evacuate a man immediately if he could not be cured and returned to duty in a week. The necessity behind this was the demand for beds. Only

when transportation would itself be dangerous could a patient be kept.

This resulted in innumerable patients being evacuated without indicated treatment being undertaken. It was felt fairer to the patient and to the next hospital to evacuate the patient immediately to the UK, where the oculist could operate without rush and follow the convalescence through.

In Liége, most of the patients requiring extraction of a foreign body or linear cataract extraction, had already had preliminary surgery a few days previously, such as excision of prolapsed uvea and a conjunctival flap. Care was taken not to postpone surgery that was urgent, but many a patient, who often had additional wounds, was sent back to western France or to England, where there was less stress, better equipment, and fewer buzz bombs, all conducive to better ophthalmic results. The average stay of an ocular patient in our hospital is shown in Figure 1.

Figure 2 shows the total number of ophthalmic inpatients admitted, an average of 9.2 per month at Bristol, 28.7 at Cherbourg,

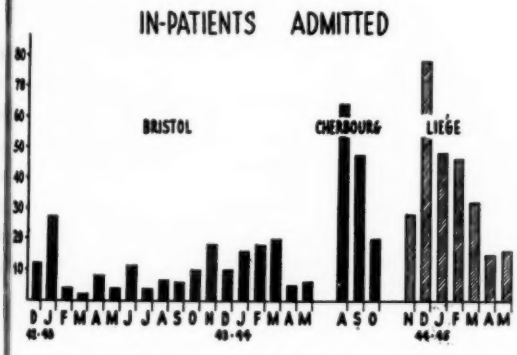

Fig. 3 (Marshall). Ophthalmic inpatient admissions per month.

and 52 at Liége. The graph in Figure 3 shows admissions monthly. The high number in December and January, 1942-43, was due to receipt of boatloads of casualties from Africa. Later such arrivals were entrained immediately for other hospitals that had opened inland. A general rise is noted through 1943 until two months before D-Day, due to a steady increase in the number of troops. The drop before D-Day was due to the freezing of units in southern England.

The high load at Cherbourg dropped as the combat line moved away to the east, and as other hospitals arrived and opened. We

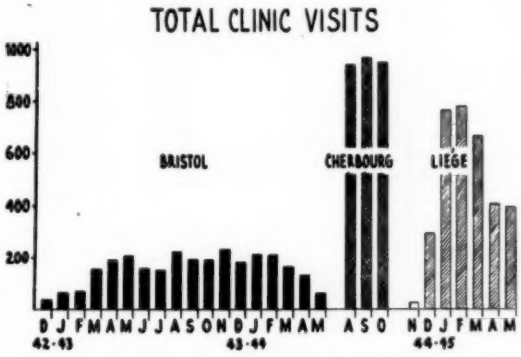

Fig. 4 (Marshall). Ophthalmic outpatient visits per month.

handled relatively few combat injuries at this site.

The peak at Liége in December, 1944, and January, 1945, was due partly to an active front near us, and still more to the Battle of the Bulge, which was close enough to force all Liége hospitals to make plans for retreating to the rear. Wounded arrived the same day as injury. We were acting additionally as a holding unit. With the spring pushes to the Rhine, the flow of casualties remained heavy, and remained so to the end, for forward hospitals kept emptying their beds in order to advance.

In general, the outpatient load (fig. 4) ran parallel with the general hospital load and with admission of inpatients. It was exceptionally heavy in Cherbourg, increased partly by required ocular examination of candidates for paratroop service. The number of refractions there was also heavy, a large portion due to arrivals of troops from the States who had been shipped out before being supplied with spectacles. The combat front had to make up the deficiencies of the home front. Again there was a peak in refractions in January and February, 1945

(fig. 5), when the scores of men came in who had lost everything in escaping before the German counterattack at Christmas time.

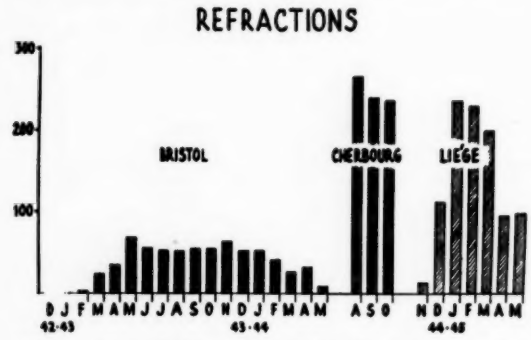

Fig. 5 (Marshall). Total refractions per month.

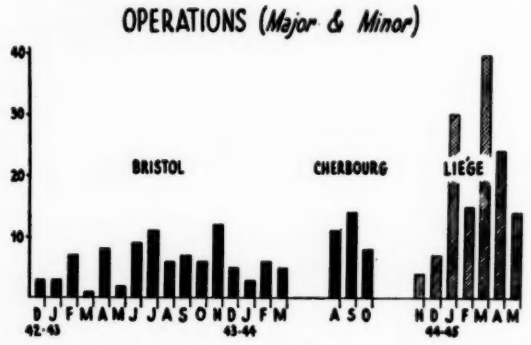

Fig. 6 (Marshall). Operations per month (major and minor).

OPERATIONS PERFORMED (IN-PATIENTS ONLY)

	BRISTOL	CHERBOURG	LIÉGE	TOTAL
Foreign body conjunctiva, cornea, sclera	5	9	18	32
Foreign body intraocular	3	3	3	9
Foreign body orbit, lids	-	2	5	7
Repair laceration globe, flap, etc.	4	10	10	24
Repair and plastic lids	10	2	11	23
Sebaceous cyst, nevus, chalazion, etc.	9	3	10	22
Enucleation	6	4	13	23
Paracentesis	-	4	3	7
Pterygium transplant	3	4	4	11
Retinal detachment	1	-	-	1
Cataract, linear	2	-	1	3
Miscellaneous	3	2	1	6
	46	43	79	168

Fig. 7 (Marshall). Operations performed (inpatients only).

Among these a large percentage had no copy of their prescription for lenses. A complete examination had to be made again.

The amount of ophthalmic surgery was perhaps surprisingly small, as shown in Figures 6 and 7. It was highest at Liége, because of the flow of combat casualties, and does not represent the total amount of surgery indicated on inpatients. Many foreign bodies, many traumatic cataracts, and some enucleations were deliberately sent on to the rear or to England. Attention is directed to the fact that no surgery was undertaken at any time for strabismus. This was in line with theater policy.

Of the purely ophthalmic surgery seen near the front two conditions were impressive. One was the great number of men with

DISPOSITION OF PATIENTS

	BRISTOL		CHERBOURG		LIÉGE	
	NO.	%	NO.	%	NO.	%
Duty	100	58.4	50	58.1	144	40.
Evacuated	28	16.3	30	34.9	196	54.4
Transfer to British Hospital	24	14.				
Transfer to U.S. Hospital	5	2.9			2	0.6
Transfer to other Service	7	4.1	5	5.8	5	1.4
On other Services	2	1.1			11	3.
St. Dunstan's	4	2.3				
Miscellaneous	1	0.6	1	1.2	2	0.6

Fig. 8 (Marshall). Disposition of patients.

multiple corneal foreign bodies, usually bits of sand imbedded at all depths, and, of course, often perforating. Such foreign bodies should not all be removed at once, but a judicious balance should be kept between removing the more irritating ones and not stirring up reaction to remove others. The other condition met, mentioned also by Culler,[4] was the relative difficulty in enucleating eyes that were literally exploded and shredded by a missile going through. The third impressive lesson of war was the vast amount of intraocular damage that may result from contusion injuries, whether direct or remote, for which there is little therapy. But it has been truly said my many authors that the professional care and scientific problems of military ophthalmology are the same as those in civil life.

Disposition of inpatients is shown in Figure 8. Well over half the patients at Bristol

and Cherbourg were returned to full or limited duty. When dealing mostly with combat casualties at Liége, this figure dropped to 40 percent, while evacuation of patients to the rear increased to 54 percent. Of course, many patients were evacuated because of other wounds, such as fractures. The evacuation figure was lowest, 16.3 percent, at Bristol, where we could hold a patient up to 180 days to effect a cure. Even then many of the patients shipped back home went because of congenital or preservice defects, rather than failure of therapy.

Figures 9 and 10 give a condensation of principal ocular diagnoses. Most patients had more than one, or several, diagnoses.

A comparison of the causes of ocular conditions, Figure 11, is revealing. Combat injuries were naturally highest at Liége. Yet that figure was exceeded at Cherbourg proportionately by noncombat injuries. Preëxisting disease and injuries were highest at Bristol, where all troops were carefully screened and classified physically in preparation for the invasion. The proportion of noncombat disease, of which uveitis is an example, remained fairly constant, while the incidence of severe hysterical amblyopia, listed as combat disease, happened to be perfectly constant.

Of practical interest is an analysis of the causes of blindness in one or both eyes, newly acquired during service.[5] About three fourths of the instances in which both eyes were blinded were due to combat injuries.

The noncombat injuries causing bilateral blindness were usually explosions, sometimes accidental, sometimes due to negligence, as when a cartridge was swept into a fire unknowingly and exploded. One accident was due to high-tension current causing third-degree burns and electric cataracts. The single instance of bilateral blindness due to disease was optic atrophy following ingestion of methyl alcohol.

Figure 12 reveals also that, particularly at Cherbourg, the frequency of loss of vision of one eye due to noncombat injury was distressingly frequent.

Figure 13 lists in partial condensation the causes of noncombat injuries. One concludes that war is a dangerous game even out of combat. At Bristol the greatest single cause in this group was a flying fist in personal assault, or a knee in football. In Cherbourg, by far the greatest number were caused by

PRINCIPAL DIAGNOSIS (*Condensed*)
IN-PATIENTS, NONTRAUMATIC

	BRISTOL	CHERBOURG	LIÉGE	TOTAL
Congenital and development defects	11	-	1	12
Functional and refractive errors	20	2	20	42
Lids and conjunctiva	15	6	44	65
Cornea and sclera	19	5	14	38
Uvea	15	9	13	37
Retina	5	1	4	10
Nerve, optic	4	4	8	16
Old injuries	10	-	8	18
Strabismus, palsies	4	-	6	10
Lens	1	1	-	2

Fig. 9 (Marshall). Principal diagnoses (condensed) inpatients, nontraumatic.

PRINCIPAL DIAGNOSIS
IN-PATIENTS, TRAUMA IN SERVICE

	BRISTOL	CHERBOURG	LIÉGE	TOTAL
Laceration lids and vicinity	5	2	17	24
Fracture orbit	3	2	5	10
Contusion by nearby missile	9	1	24	34
Contusion by direct blow	4	13	39	56
Burns and blast	1	2	8	11
Abrasion cornea and conjunctiva	-	-	25	25
Wound globe, previously enucleated	19	2	11	32
Foreign body cornea	4	10	48	62
Foreign body intraocular	8	8	19	35
Foreign body orbit	1	2	8	11
Laceration or perforation globe	11	9	76	96
Enucleated, in for prosthesis	2	-	4	6
Miscellaneous	5	2	5	12

Fig. 10 (Marshall). Principal diagnoses, inpatients, trauma in service.

CAUSE OF OCULAR CONDITION

	BRISTOL		CHERBOURG		LIÉGE	
Injury, combat	39	23.5%	7	9.2%	183	50.3%
Injury, noncombat	16	9.6	42	55.2	79	21.7
Injury, pre-existing	8	4.8	-	-	1	0.3
Disease, pre-existing	49	29.5	4	5.3	23	6.3
Disease, noncombat	52	31.3	22	28.9	74	20.3
Disease, combat PN	2	1.2	1	1.3	4	1.1

Fig. 11 (Marshall). Cause of ocular condition.

explosions in the hand, or equally close. Perhaps because they were new to war and typical, souvenir-minded Americans, many a soldier in Normandy attempted to keep, deactivate, or alter into cigarette lighters various German shells and cartridges, particularly the attractive German 20-mm. ack-ack shell. This shell had a double and highly

NEWLY BLINDED

	Unilateral						Bilateral		
	*CI	%	*NI	%	*DIS	%	CI	NI	DIS
BRISTOL	20	57.1	6	17.1	9	25.7	4	3	-
CHERBOURG	6	23.	14	54.	6	23.	-	1	-
LIÉGE	82	76.6	23	21.5	2	1.9	17	1	1

*CI = Combat injury
*NI = Noncombat injury
*DIS = Disease

Fig. 12 (Marshall). Newly blinded.

CAUSES OF NONCOMBAT INJURIES

	BRISTOL	CHERBOURG	LIÉGE	TOTAL
Fell or bumped object	3	-	13	16
Object thrown or swung	2	9	12	23
Fist, knee, etc.	4	4	7	15
Handling arms	-	1	7	8
Vehicle accidents	-	1	11	12
Explosion in hand or nearby	1	15	8	24
Explosion in fire	-	3	2	5
Hamnering, chopping	3	1	7	11
Fire, chemicals	1	1	6	8
Mines, booby traps	1	4	2	7
Cut by glass in fight	1	-	1	2
Electric burn	1	-	-	1
Miscellaneous	1	1	1	3
				135

Fig. 13 (Marshall). Causes of noncombat injuries.

sensitive firing mechanism, which went off too easily and too often.

Some explorers of forts were caught and injured by accidental explosions, over-inquisitiveness, or booby traps. Almost invariably the eyes were involved, either by superficial foreign bodies or by perforating wounds.

The 20-mm. shell injury became a clinical picture that could be diagnosed down the hall on admission—a man brought in with both hands heavily bandaged, face and neck covered with bleeding points, and one or both eyes padded. Three times I removed cancellous bone from around or even within the eyeball, in each instance a piece of bone from the patient's own finger, which had been blown off by the shell in his hand, or in a vise while he worked on it.

Considering total figures, the largest number of noncombat injuries were caused by explosions nearby, as by shells, grenades, and detonators. Nearly an equal number were caused by something thrown or swung at the eye, as boards, branches, a bayonet, stone, rifle barrel, nail, and so forth. The last eye I enucleated in service was that of a nurse, the globe ruptured by a swinging golf club. Many men accidentally bumped or fell onto objects in the confusion and darkness, and many an eye was lost in personnel fights.

In 1942, Col. Derrick Vail, before becoming European Theater Consultant, proposed that means be found to protect eyes in war. Visors, made of metal, were studied in this country and in England.[6] They would interfere with the field of vision but if used at the right time would save scores of eyes. Rycroft[7] suggested using the antigas shield, a simple goggle of plastic, in various noncombat activities where particles of metal or chemical may fly toward the eye. Unquestionably, better protection would save many eyes in combat, while goggles and more care would reduce greatly the devastating number of eye injuries from accidents and carelessness behind the lines.

Ophthalmic problems of wartime

Now, I venture to comment on several ophthalmic problems of wartime, realizing full well that others have had more experience and are better informed to discuss them than I. Let me preface these remarks with an expression of gratitude to Col. Derrick Vail, who, as Senior Consultant in Ophthalmology, was the first to foresee these administrative problems and was constantly and successfully striving to effect their solution. His planning and energetic work

made a tremendous difference in the entire picture.

The problem of how to keep busy, up-to-date, and dexterous is a universal difficulty of the doctor at war. In England, many ophthalmic officers were allowed to attend lectures and meetings of British ophthalmic groups; some fortunate ones spent a two-weeks period observing work at Moorfields in London. An ophthalmic club was formed, which held several worthwhile meetings. And after hostilities, a group under the leadership of Maj. F. P. Calhoun took a series of lectures at Oxford, then toured the island visiting prominent clinics. It is impossible to be prepared for large-scale combat without idle troops and officers, if sufficient medical personnel is present to carry the combat load later. But that medical personnel must be kept active in their work and constantly stimulated.

At least in general hospitals, it was early agreed that the Sections of Ophthalmology and Otolaryngology should be separate in personnel and management. This is proper, avoids friction, is logical. The head of each section, if adequately trained, should be entitled to the rank of major.

Ophthalmology seemed to have no special problems in finding a place to work that did not apply to most of the hospital. Whether it be in a tent, a hut, or a building, a little imagination easily arranged an adequate outpatient clinic in the available space, even to a dark room. In England, a few hospitals had a special EENT major operating room. In the 298th General Hospital, all major surgery was done in the general operating rooms.

Electric current varied

Electric current was at times a problem for all. At Bristol American equipment took 115 volts, and American connecting plugs would not fit the British receptacles. The British current supplied was 220 volts. The search for transformers and plugs was long and trying, and it took months before all was smoothed out. At Cherbourg and Liége electric current was undependable, so that, in the clinic, battery current was used almost entirely for examining instruments. Water supply was fitful at Cherbourg, and was cut by a single bomb at Liége, which almost closed the operating room for a few days. An army general hospital in that theater was not set up to be completely self contained and independent. In our specialty it must be remembered that correct current is essential for use of the diathermy, the electric magnet, and the Projecto-chart.

Equipment problems

Surgical and diagnostic equipment for ophthalmology is an important problem now being reviewed by the Subcommittee on Ophthalmology of the National Research Council. Colonel Vail spent his early months in Britain seeking adequate ophthalmic equipment for his officers. Table of Equipment (TE) was not bad, but allowed for much improvement.

Getting the items allowed was still another problem. Strabismus hooks and cilia forceps were a dime a dozen, but tenotomy scissors were scarce, and a Schiøtz tonometer was almost never seen at all. It is not easy to make one list that will suit all surgeons. Yet such an analysis as is now under way should find room for worthwhile changes.

We were supplied with a Lancaster hand magnet and a retinal detachment outfit that attached to the Bovie unit and both did well. Perimeters were not supplied, but were obtained for a few by luck. Another instrument, not supplied by the army to the European Theater but found to be essential, was a slitlamp. Most of us in England eventually acquired a British-made simplified slitlamp that was adequate, and a few found their way to the continent before VE-Day. In the future, a slitlamp should be standard for any general hospital, although it may be necessary to develop a simplified, more portable model for this purpose.

In late 1942 and early 1943, the African

Theater seemed to have priority over Britain in American supplies. Therefore the six general hospitals first to arrive required and received through lend-lease much British ophthalmic equipment. Some of this was excellent, well above usual military quality. Without it we could hardly have functioned. The ophthalmic equipment eventually assembled at the 298th General Hospital by D-Day was more than ample, perhaps more complete than any other U. S. hospital in England. This was due to the continued efforts of Colonel Vail, and our honest search over a period of a year and a half. Having thus prepared for the rush anticipated after the invasion, it was particularly painful to be ordered to leave all this in place, turning the entire hospital and its equipment over to another unit in May, 1944.

Optical problems

One major problem was the optical one. Unquestionably this will always be with us, and will almost certainly increase in another war.[8] A poignant example of the importance of the problem is that at one time the British had 7,000 men at camp near Cairo who had been evacuated from the front for replacement of glasses.[9] A man who cannot see adequately is a casualty and as noneffective as a wounded man.

Today in war, good vision is required for flying, for aiming, and for driving a vast mechanized army on wheels; and behind the lines, many a farmer boy becomes a clerk or a radar operator and discovers his eyes need help. In addition, many men with special ability and training are so valuable that they are needed despite glasses. Unquestionably, from the viewpoint of manpower and man hours, the whole field of refractions and spectacles is one of the biggest that needs careful study and solution for the future.

Like others, I ran into this problem from several angles. During a brief training period in Arkansas, I had seen a capable ophthalmologist and his willing but untrained assisting officer attempt the impossible of refracting up to 100 inductees a day. In England, there was more leisure, and many a hurried refraction was repeated and the lenses perforce changed, a waste of time and lenses.

Refraction needs

Another minor problem at Bristol was the number of men, especially Negroes, working as stevedores at Bristol channel ports, who legally acquired a day of rest by arranging for the long trip by ambulance from their station to the 298th General Hospital for refraction. They had ample symptoms, and poor visual acuity, but the vision improved miraculously as soon as a trial frame was put on, whether it contained any lenses or not.[10] There is no sure way of determining whether or not a soldier needs glasses, if he has symptoms, without refracting him. Scores of refractions proved unnecessary except for making that decision.

In England, everyone was checked physically, which disclosed many cases of amblyopia and disqualified men who never had met induction standards. This caused many to be sent home, another waste of time and effort. It also proved to be a waste of manpower, for the return flow became so heavy that it was stopped, the new policy being to keep men in Britain who had only one good eye, or a high refractive error. We put them on limited or noncombat duty. The British, harder pressed, sent their one-eyed men almost up to the front line.

Delivery of glasses

In Cherbourg, troops were arriving by shiploads. Many had not received their glasses before leaving home. Delivery of spectacles in the States at that time seemed to take about four weeks or more. In Britain, we got delivery in from 3 to 7 days for ordinary strengths. In Cherbourg, delivery took three days or more, depending on the quality of the courier service at the moment.

In Liége, we had delivery in 24 hours most of the time. The story of supplying spectacles and gas-mask lenses in the European Theater is an interesting one that could be told by Colonel Vail or one of his optician officers.

Breakdown in record system

The Battle of the Bulge brought home the realization that despite repeated directives there was an actual breakdown in the system of keeping records of the individual prescription for glasses. Men swarmed in for new replacement spectacles. They had lost everything, their personal records, their headquarters records sometimes, and often their "dog" tags.

To supply new glasses they had to be examined from the beginning again, and this despite regulations requiring that their prescriptions be in two places in their records and a third independent copy on their person. As Sir Stewart Duke-Elder has remarked for the British, in the early days provision for glasses was inadequate because their importance was not foreseen and because their enormous wastage was not anticipated. He was forced to change the whole set-up for the British Army. It is probably not practical to put the prescription on the dog tags, but every effort should be made to devise a more certain means of always having it on the person of the soldier.

Optometrists did excellent work in the ETO, and without them the number of refractions done would have been only a portion of the actual accomplishment. They varied of course in their aggressiveness and personality, their self confidence and ingenuity. They were always responsible to a medical officer in their professional work. Effort was made to put them where they could give the most help. I believe most ophthalmologists were grateful for the help they received from them. Placing optometrists in a medical service corps is a logical step, and will allow them a rank more commensurate with their technical ability.

Gas-mask frames were not satisfactory. The gas-mask insert lens, hurriedly supplied to all who seriously needed them before the Normandy invasion, seemed to work very well. Not as important, nor as well solved, was the need for a simple, reliable test for night vision.

Diseases encountered

A few diseases encountered, although not differing from those found in civilian ophthalmology, had peculiar aspects in the service. One was pterygium, which was something every eye man not too busy was eager to tackle, for it afforded an opportunity to "keep his hand in" with little serious risk. The problem was that of recurrence. One soldier at Valley Forge Hospital in this country had had 13 recurrences and 12 operations. Toward the end of the war in Europe some pressure was made from higher levels to avoid surgery for pterygium except in the most severe degrees.

A similar situation was found with strabismus. Many a surgeon with little surgery to do did muscle cases to benefit both the patient and himself. Such correction of a severe cosmetic defect has been advocated[11] in order to improve personality and to enable reclassification to full military duty.

On the other hand, I have watched over Prof. Ida Mann's shoulder at Moorfield's while she interviewed a British soldier dropped from his army because of diplopia following surgery for squint, with excellent cosmetic results. And I have seen an American G. I. evacuated back from the front with the same story, and with the ophthalmologist's name typed plainly on the first section of the field medical record.

Both surgeons were good and did good work. Neither soldier seemed to be a malingerer or quitter. Nevertheless, diplopia of a disqualifying degree seemed surprisingly prevalent following surgery for strabismus in service, and it, therefore, became a service-connected disability. Such surgery was

officially frowned upon in the ETO.

Uveitis in all its forms was a problem because it incapacitated a man for so long. A total of 34 cases of endogenous or nontraumatic uveitis were seen, the larger number at Bristol. Phlyctenular keratitis for some reason was much more frequent in England than on the continent.

What to do with the one-eyed man in an army is a question that should be given a studied and clear answer before another war. He lacks stereopsis, yet many a one-eyed man drives well. Wiley Post flew around the world successfully with only one eye. Amblyopia is frequent; enucleations increase as the war progresses. Need the lifelong amblyope be restricted in ordinary duties? The newly blinded must of course go through a period of readjustment.

The newly developed plastic prostheses, made by staff dental officers, proved relatively simple, very satisfactory when done by a capable man, and a happy solution to a difficult shortage. That story has been told elsewhere.

Several authors during and since the war have emphasized the importance of discovering early the presence of ocular injuries, which may so easily be overlooked in the presence of additional, often more severe wounds. The answer is training of forward medical officers to examine the eyes routinely, at least superficially, for signs or symptoms of ocular injury or defective vision.

Sulfonamides and penicillin, which were given to all wounded almost without exception, reduced the incidence of serious ocular infection almost to the zero point. Gross infections were few, and I saw no case of sympathetic ophthalmia in three years' service.[12]

Management of ophthalmic patient

The management in service of an ophthalmic patient varies with many factors. The actual medical care differs little or none from civilian methods. That point has been repeatedly made by many authors. Intervening conditions pose many problems, however.

A patient may arrive who was injured 10 minutes before in his company area, or 10 hours before at the front with no previous treatment, or 3 days before, with prolapse excised and a conjunctival flap in place, or 30 days before with a month's treatment in a station hospital intervening.

He may or may not have other injuries which take precedence. You may be allowed to keep him six months, or be urged to evacuate him the next day. You may have all needed equipment for his required surgery, or you may be without electricity and water.

In these respects military ophthalmology differs greatly from civilian. Although a few general rules could be laid down, each patient needed an individual decision. The need for beds and current directives, his general condition or other wounds, the amount of preliminary surgery already done, and the period required for convalescence all were factors that made up the picture. Occasionally equipment was decisive. Another factor that undoubtedly altered management was the training and confidence of the ophthalmologist, a factor that probably weighed in both directions depending upon the man.

As patients and their records came back from the front, it was possible soon to assess the capability and conscientiousness of those ahead who were doing ophthalmic surgery. Such an evaluation became of importance when the patient arrived with his wounds or eye hidden by a partial or total conjunctival flap. Important and useful as they may be, and perhaps essential, conjunctival flaps, like a plaster cast, hinder revaluation of the patient's condition as he travels back through the chain of evacuation.

How close behind the lines should a capable ophthalmologist be? This would seem to depend on the stability of the line, the speed of evacuation, and the capability of the general surgeons at the front. It would

seem highly desirable that an ophthalmic casualty be able to reach a trained ophthalmologist within 24 hours following injury. Barring that, he should reach the hands of a general surgeon well versed in ophthalmic first-aid procedures. Some of the surgical auxiliary teams had such men, who in a pinch could and did do an excellent excision of prolapse with conjunctival flap. After preliminary study and surgery by a trained ophthalmologist, the patient, if seriously injured, should be flown to an ophthalmic center, where good equipment, adequate help, and some peace of mind for both patient and surgeon are available. As noted by Duke-Elder, the proportion of injured eyes lost in World War II was only half that of the previous war, the reduction being due not only to advances in surgery, but also to the increased speed with which the injured patient was placed under trained care.

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Discussion

Dr. F. Phinizy Calhoun, Jr., (Atlanta, Georgia): The basis for my comments on this paper is my service as ophthalmologist for the 2nd General Hospital from February, 1942, until October, 1945, of which 40 months were spent in the ETO.

Like Dr. Marshall's unit, my hospital functioned in three main sites, the first in Oxford, the second near St. Lo, and the third in Nancy, France. I have read with interest Dr. Marshall's full-length detailed report and I would like to compliment him on the careful records he has kept and on his splendid analysis of his cases. His tables show distinctly how the type of work and method of handling of eye cases varied with the military situation, and, in general, the tables are representative of the type and volume of work done in other outstanding general hospitals in the ETO.

Probably the most important single factor in the effectiveness of eye care in England and in France was the fine work of the Senior Consultant in Ophthalmology, Colonel Vail, and of his successor, Colonel Greear. The presence of these men to correlate all eye care, to prod the chiefs of supply and personnel, to put ophthalmology in the limelight, and to forward international relations, was very essential and effective. I

am proud of the splendid way in which they met and overcame almost unbelievable difficulties in policy, and in men and equipment, elevating ophthalmology from a relatively obscure position in military medical care to a very secure one.

I would like to say a word about the ETOUSA Ophthalmological Society formed in early 1943 at the suggestion of Colonel Vail. In the beginning, composed of the handful of eye men in the ETO who were doing eye work, this little organization was paramount in bringing us together so that we managed to have three large meetings before the preparations for D-Day scattered us.

The distinguished honorary members of the society were Colonel Vail, Brig. Sir Stewart Duke-Elder, Lieut. Com. Edwin B. Dunphy, Sir Ian Fraser of St. Dunstans, and Air-Commodore V. C. Livingston.

Dr. Eugene Anthony did a splendid job as editor of the "Journal," and three issues were published. This little journal was very important in the dissemination of eye information to all of us. Besides containing short biographies of the members, the "Journal" gave case reports, abstracts, short original articles of topical interest; summarized military eye directives which changed frequently and often never reached us in any other way; and gave us the latest information about services for glasses, diathermy, magnet, prostheses, and pathologic specimens.

Most important of all, I believe, the "Journal" had a helpful-hints section, which proved a great aid to us in our improvisations. We very quickly learned that we had to improvise to be of any use ophthalmologically, and this section in the "Journal" helped us along those lines. There were set forth simple methods of sterilizing solutions and instruments; of making our own sulfa ointments; measurements for the construction and marking out of a home-made Bjerrum screen; methods for the construction of perimeters, irrigating tips, depth-perception apparatus, and so forth. A good replaceable eye dressing in use at the 5th General Hospital was publicized. I know of one man who constructed from odds and ends a satisfactory slitlamp, and of several who made effective magnets from radar equipment.

I wonder if any of you have thought enough of your three issues of the *ETOUSA Journal of Ophthalmology* to have them bound. They have already become collectors' items, and your medical library would be glad to get them.

Another factor that contributed greatly to the success of eye care in England was the close coöperation of the British, not only as civilian and military groups, but as individuals. Prior to the landings in North Africa in November, 1942, no American equipment was made available to us, and for the next year only a little was available. We, therefore, had to depend almost entirely on British facilities and equipment, which, incidentally, was always of high quality. The British helped greatly in the spectacle program, began the training of some of our blind at St. Dunstan's, furnished us prostheses, a magnet and diathermy service, individually loaned us instruments and equipment, and were always willing to aid us with our problems.

This coöperation was further brought home to me after V-E Day when, in July and August, 1945, I was asked to help Lieut. Colonel Greear, the senior consultant in ophthalmology, organize a posthostilities training course in ophthalmology to be given at Oxford, England, under the direction of Prof. Ida Mann. Eminent British ophthalmologists throughout the United Kingdom were interviewed and worked into a time table. I found that the lecturers, all prominent in British ophthalmology, were most eager and willing to do all they could and on one refused the invitation to participate. This spirit was a great tribute to the friendly and coöperative relationship between American and British ophthalmologists established

during the war by the successive senior consultants in ophthalmology.

Although allocations were made for 40 men to attend the course, which lasted four weeks, the base commands, due to redeployment responsibilities, unfortunately could only incompletely fill their respective quotas, and only 22 men were released to attend the course.

The course was successful in providing a taste of academic ophthalmology to men who had been doing military ophthalmology for varying periods of time. These men were uniformly eager and appreciative of the opportunity offered them by the U.S. Army, and were repeatedly impressed by the education, poise, and ability of the British lecturers, many of whom were internationally known.

Amid the historic and scholarly surroundings of Oxford, to sit at the feet of Ida Mann, H. M. Traquair, Foster Moore, Eugene Wolff, Charles Goulden, McCallan, R. E. Wright, John Foster, Greeves, and others, was indeed an impressive and memorable experience for each American student of ophthalmology.

Dr. Marshall has asked me to say something about air casualties, since my unit treated a large number of all types in 1942 and 1943. Excluding the many cases of accidental injury and the few cases of solar retinitis and of eye changes due to frostbite, there were 33 crew members of the heavy bombers of that period who received eye wounds due to enemy shell fire.

Since most of the injuries were due to the 20-mm. cannon shell which exploded at a fairly constant distance from the airman upon striking the duraluminum skin or plexiglass, most of the wounds were combined with concussion and were due, at least in part, to flying particles of aluminum or plexiglass. The fragments of the brass percussion fuse and the steel casing of these projectiles, together with the large steel fragments of anti-aircraft fire from the ground, were additional sources of eye injury.

All but four of these 33 men had other severe wounds, usually of the head. I cannot fully explain why the right eye was injured more severely and exactly twice as often as the left. It was miraculous that only 8 of the 33 had even a slight injury to the opposite eye, and only one case was permanently blinded in both eyes. Seventeen, or about one half, of the 33 had a penetrating wound of the eye, and 9 of these required early or subsequent enucleation.

One half the cases of penetrating wounds were due to metallic fragments and one half to plexiglass fragments. Only 2 of the 8 cases with metallic intraocular foreign bodies proved to be magnetic, and in one of these cases the foreign body was magnetic in both eyes. Magnetic foreign bodies were frequently found in other parts of the body, and every effort had to be made to exclude them in the eye.

In the 16 cases in which a nonpenetrating injury was the principal diagnosis, a rupture of the choroid, manifest as an indirect concussion injury, was present in 7 cases. Most of the remaining cases were multiple plexiglass foreign bodies of the cornea. Although the airman's eye wound resembled most closely the land-mine wound of the foot soldier, I believe the air injury was more often unilateral and showed less tendency to reaction and infection. Unlike the sand and gravel and powder particles in the land-mine injuries, the eye tolerated small particles of aluminum and plexiglass without continued reaction.

I would like to mention several impressions with which I returned after service in the ETO. First, the extreme importance of the careful rehabilitation of otherwise healthy soldiers who have very suddenly and irrevocably lost one eye due to severe injury. We learned that if they were allowed to sit around and were not immediately taught confidence in themselves and helped

in learning a new way to judge depth, they would quickly grow psychologically past any useful military service in the ETO or elsewhere. Early and persistent efforts at ping-pong was one of the most useful things in this rehabilitation.

Secondly, the complete conjunctival flap with a pursestring suture not only made further evaluation and treatment by the next ophthalmologist difficult, but in several cases provided a shortened postenucleation socket due to a too firm and too abundant inclusion of conjunctiva.

Thirdly, I believe that the many cases of uveitis, particularly exudative choroiditis, resulted in a longer incapacity and a longer combined loss of time from duty, than almost all other conditions.

Fourthly, I believe that in the future some modification of the Berman locator will be a most useful instrument in the early management of foreign-body cases, and that such an instrument will be basic equipment. I might also add that in my experience in the ETO I was never successful with either the Mellinger or Solus giant magnets in cases where the Lancaster hand magnet had failed.

DR. TRYGVE GUNDERSEN (Boston, Massachusetts): I have been asked to add the experiences and resulting points of view of those of us who were in the North African and later the Mediterranean Theaters where our forces were engaged in a war without interruption from November, 1942, to May, 1945. The action involved long campaigns through enemy country which varied from deserts to snow-capped mountains. It involved seven widely separated amphibian landings, one of which was relatively ill-fated.

It is to be remembered that at Anzio the entire beachhead was under daily enemy shell fire for more than five months. Furthermore, long holding operations at times made the warfare in this theater similar to that of World War I. It was a theater which involved almost every phase of modern warfare.

Besides being the most enduring fighting battlefield of World War II, the North African and Mediterranean areas offered an interesting battlefield from a point of view of sanitation and health. It is of everlasting credit to the medical department of the United States Army that over 500,000 Americans could be kept in that disease-infested country and remain as healthy as if they were at home.

I shall only mention the almost complete absence of such scourges as typhoid, smallpox, typhus, plague, and leprosy. Malaria was certainly uncommon, too. Duke-Elder states that practically the entire French Army of 32,000, and to a less extent the British, fell a victim to trachoma during the Napoleonic campaign in Egypt in 1798-99, and immense numbers of them were sent home blind.

During my service in these theaters, 26,223 patients were admitted to our hospital, of whom 1,936 were eye patients. In addition, I saw 3,075 for refraction, and 1,090 for other conditions in the outpatient department. This comprises a total of 6,101 patients seen by me.

The diagnosis of trachoma was made only seven times. In six, the infection was obviously old. Only one soldier contracted the disease overseas. Other ophthalmologists had comparable experience.

Dr. Marshall has mentioned how to utilize ophthalmologists in the theater. Everyone will grant that early operation is ideal and that the first operation should be the definitive one. Therefore, one's first thought is, "Place the eye surgeon forward as far as possible." But competent eye surgeons are rare. In my visits to each of our 84 hospitals, I found only seven doctors who had been certified by the American Board of Ophthalmology. There were perhaps an equal number of qualified, though noncertified, men.

The flow of casualties from a military

front may be compared to the flow of a river, for instance, the Mississippi, with casualties trickling or often flooding down from every rivulet, feeding the whole stream, through the Ohio, the Missouri, the Arkansas, and so forth. Every drop of water must be treated, preferably as soon as it falls from the sky, but remembering not to miss a single drop. It would be folly to waste good men by placing them along the Teche of Louisiana, the Fox of Wisconsin, or even the Chicago River of Illinois.

The problem of distributing ophthalmologists can be met by the creation of mobile ophthalmic teams, who might be hurried in to cope with flooding areas. This was part of the British plan. The disadvantages were the handicaps involved in doing major eye surgery under field conditions and the necessity of early or often immediate evacuation of patients postoperatively. Since eye casualties are transportable as litter patients with binocular bandages, and since they can no longer be considered emergencies—thanks to sulfonamides and antibiotics—it is my opinion that patients fare better when promptly evacuated to a first-class eye surgeon in a first-class hospital (eye center), be it several hours further behind the lines.

A different problem arises in regard to refraction. Equipment for refraction was not authorized for evacuation hospitals at the onset of World War II. Until this serious defect was rectified, combat men had to be

	No. of Cases	% of Total Hospital Admissions	% of Patients Seen Including O.P.	% of Patients with Eye Diagnosis
Total hospital admissions	26223	100		
Battle casualties	7090	27		
Injuries	4504	17.2		
Disease	14629	55.8		
Total patients seen in Eye Clinic (Including out patients)	6101	-	100	
Refractions	3075	-	50.4	
Out patients	1090	-	17.86	
Total patients admitted to hospital with eye diagnosis	1936	7.37	31.74	100
Primary eye diagnosis	1172	4.46	19.2	97.8
Secondary eye diagnosis	764	2.91	12.54	2.2
Eye patients admitted to hospital as battle casualties (3.38% of all the patients admitted to hospital as B.C.)	241	0.91	3.95	12.50
Eye patients admitted to hospital due to injury, accidental (5.63% of all hospital admissions due to injury, accidental)	255	0.97	4.17	13.17
Eye patients admitted to hospital due to disease (9.83% of all hospital admissions due to disease)	1440	5.49	23.62	74.33
Total glasses ordered 1374 (44.68% of refractions)				

Fig. 1 (Gundersen). Table showing number and classification of patients seen by the Eye Section, 6th General Hospital, from March, 1943, to December, 1944.

evacuated to general hospitals or station hospitals in the communication zone for an ordinary refraction. During the Anzio engagement, the problem became serious because of the large numbers of soldiers applying for evacuation and the difficulties involved in evacuating them.

The general hospitals in the Naples area were unnecessarily cluttered with these otherwise healthy men. Not until Maj. William H. Droegemueller and Maj. Edmund B. Alvis, each with an assistant, volunteered to establish a refraction clinic on the Anzio beachhead was this problem solved. These two ophthalmologists performed over 1,200 refractions on this dangerous beachhead. Their service has never been fully recognized, and I wish to commend them before their colleagues assembled here.

For those of us who joined the Army after our 40th birthday, and for many others, Army life was technically a voluntary project. Those who were by nature provident and farsighted did everything possible to anticipate their wants and increase their efficiency. Some studied the Officers' Guide Book; others took correspondence courses in everything from the detailed organization of a pack artillery regiment to just how to pile manure in the accepted Army manner. The benefits derived therefrom were somewhat questionable.

Of greatest benefit to me were the tools of my trade, which I carried with me. My ophthalmic surgical kit was small, but carried my favored instruments. The contents which I found most useful included my own needle holder, speculum, assorted forceps, chalazion clamp, six packages of Kalt corneal needles, several spools of 0.0025 fine silk, a set of Walker pins, several good Stille scissors, and a magnetic probe. In addition, a complete set of instruments for corneal transplantation happened to give me great pleasure.

While in Morocco, where human life is cheap and animal life is cheaper, our hospital established an animal farm with an excellent Arab diener who nursed our animals for fifty cents a day, plus three meals of good army food. There was an abundant supply of rabbits, other rodents, and some monkeys. It gave great opportunity for experimentation during the quiet periods.

The diagnostic equipment that I carried

	20 March 1944		25 June 1944		25 Sept. 1944		25 Feb. 1945		Average	
	Actual Number	%	Actual Number	%	Actual Number	%	Actual Number	%	Actual Number	%
Total Hospital Census	33,861		32,668		25,767		22,275		28,643	
Less P.W. & Allied Troops			4,762		2,202		1,960		2,231	
Total Hospital Census (U.S.)	33,861	100	27,906	100	23,565	100	20,315	100	26,412	100
Battle Casualties	9,361	28	11,509	41	7,924	34	2,670	13	7,866	29
Injuries	4,282	13	4,226	15	3,412	14	3,103	15	3,756	14
Disease	20,218	59	12,171	44	12,229	52	14,542	72	14,790	57
Total Eye Cases	672	1.98	604	2.16	553	2.35	352	1.73	545	2.06
Eye Battle Casualties	244		248		224		99		204	
% of Eye Cases		36		41		41		28		37
% of Census		.71		.89		.99		.49		.77
% of Battle Casualties		2.60		2.15		2.82		3.70		2.57
Eye Injuries	88		94		68		45		74	
% of Eye Cases		13		16		12		13		13
% of Census		.25		.33		.28		.22		.28
% of Injuries		2.05		2.22		1.99		1.45		1.96
Eye Disease	340		282		261		208		267	
% of Eye Cases		51		43		47		59		50
% of Census		1.01		.93		1.10		1.02		1.01
% of Disease		1.68		2.15		2.13		1.43		1.80

Fig. 2 (Gundersen). A consolidated report showing battle casualties, injuries, and disease. (Summary of four "spot checks.")

with me included two ophthalmoscopes (fortunately, these had large handles which accepted the standard Army dry-cell battery), a retinoscope, my own trial frame, and cross cylinders. These items were used daily, and obviously suited me better than anything the Army offered.

There was little hope of carrying heavy books until the hospital library became organized. When this happy day was announced, the librarian accepted my three volumes of Duke-Elder's textbook and several other classics from my own shelves.

Dr. Marshall has given us an interesting account of his long and splendid service for the American soldier. It is a pleasure to add my own statistics and those of the Mediterranean theater to his (figs. 1 and 2).

DR. DON MARSHALL (closing): I wish to thank Dr. Calhoun and Dr. Gundersen for their valuable and most interesting additions to my paper. Their experience was far wider than mine.

CANCER AND THE LENS

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AND

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Cancer of the lens has never been observed. What are the anticarcinogenic factors which render the lens immune to cancerous invasion?

The lens is composed of epithelial cells which continue to multiply throughout life, and constitutes a complete, metabolically active organ in itself. It is, however, characterized by certain special features which distinguish it from all other organs. Hence it appears logical to focus attention on those features which make the lens a unique structure. Some of these cannot at present be related to the biology of cancer; for others the underlying mechanism is unknown. The discussion of these possibilites is presented in the hope that it may stimulate experimental research.

ACCESS TO THE LENS

Assuming that cancerogenic substances are introduced into the organism or originate within the body outside the lens, what are the chances for the carcinogen to reach the lens proper?

Passage. The lens is suspended by means of the zonule fibers like a spider in its cobweb. An agent can reach the lens only through the aqueous; it must be able to pass through the ciliary processes and be soluble in the aqueous.

The ciliary processes present a formidable barrier against transmission to the lens from without. Larger molecules, such as protein or bilirubin (even in severe jaundice†), do not pass into the aqueous. Two possible deterrents, therefore, may prevent a carcinogen from acting upon the lens. The agent, because of its chemical structure, may not pass into the aqueous at all; or it may enter the aqueous only in such insignificant amounts that the threshold concentration for carcinogenic actions is never reached.

Diffusion. If it be assumed, however, that a carcinogen should penetrate the barrier of the ciliary processes and concentrate in suf-

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† Unpublished experiments.

ficient strength in the aqueous, it would still have to penetrate the lens capsule in order to reach the lens proper. The capsule provides another barrier because it permits diffusion only at a very slow rate.

If the permeability of the capsule decreases with advancing years (as assumed by several authors[1]), age, generally promoting development of cancer, would exert an adverse influence in the lens.

Solubility. The aqueous is a true watery solvent and is practically devoid of colloids, protein, and fat.[2] The majority of carcinogens studied so far are water-insoluble. Hence a carcinogen belonging to the group of water-insoluble agents could not reach the lens.

Secondary aqueous. The physiologic properties of the aqueous change radically after tapping the anterior chamber. The secondary aqueous, formed after draining off the primary, resembles blood plasma in many respects. By applying this technique, it should be experimentally feasible to expose the lens to known carcinogens in adequate concentrations, and thus learn how the lens reacts to a carcinogen when contact is actually made.

Biologic considerations

General nutritional factors. The lens, unlike other organs, does not depend upon the blood for nutrition; its nutrition is derived from the aqueous. The chemical and physical differences between these two media are associated with another difference of equal significance. Other organs possess means for controlling the influx of nutrients through regulating the blood supply; the intensity of normal-lens metabolism is dependent upon the composition of the aqueous. No mechanism is known through which the lens could induce the aqueous to furnish nutrients at an increased rate if higher requirements than the normal should arise, as would be the case if cancer should develop.

The lens may then be considered as an organ under permanent and rigid caloric restriction throughout life. To a certain extent its low metabolic activity is indicated by the rate of oxygen consumption. Even in youth oxygen consumption is only a fraction of that of other body tissues. Increasing age further reduces the respiratory activity. The lens with a cataract takes up even less oxygen than a normal one.[1]

Caloric restriction is known to have an anticarcinogenic effect on cancer incidence and development. The conclusion may therefore be drawn that the lens, an organ with a minimum of metabolic activity, cannot be very susceptible to cancer. Age and cataract formation (in which glycolysis also drops far below normal) create conditions even less favorable for cancer. If, however, cancer should get a foothold in the lens, the first few malignant cells would find a paucity of nutrients and would be unable to induce more ample nutrition by stimulating ingrowth of vessels. Rather, in the initial state when most vulnerable, they would be compelled to compete with the normal lens cells for the scarce available nutrients.

Special nutritional factors. The energy requirement of the lens is supplied by carbohydrates, probably in the form of glucose alone. Of the two mechanisms for glucose utilization in the body—aerobic oxidation to CO_2 and H_2O, or anaerobic glycolysis to lactic acid—the anaerobic process is much more important.

The normal energy metabolism of the lens is thus keyed to a type of glucose utilization which cancer in the lens—most likely of epithelial origin—must adopt due to the lack of oxygen. Thus the first few cancer cells would have to begin life in competition with a group of normal cells which are dependent upon the same type of glucose metabolism. The advantage of cancer cells over normal cells would not exist in the lens.

In contrast to other normal tissues (which utilize both mechanisms) the lens alone possesses a complete glycolytic enzyme system, but a vastly inferior respiratory enzyme system. Neither cytochrome nor cytochrome oxidase are present in the lens cells.[1]

A highly developed capacity for anaerobic glycolysis does not suffice in itself, however,

to render tissues cancer resistant, as evidenced by the retina. The retina exhibits the highest glycolytic activity of any tissue studied so far, and it also has a significant oxidative capacity; yet cancer develops in the retina (retinoblastoma).

Other biologic considerations. The suggestion has been made that cancer cells originate and begin to proliferate in response and as an adaptation to conditions which interfere with the growth and proliferation of normal cells.[3] On the basis of this hypothesis, the increase of cancer incidence with advancing age has been referred to the retardation of growth, associated with senescence, promoting discontinuous growth or proliferation.

In the lens, cellular growth and proliferation are extremely well controlled. If it were different, the value of the lens as a refracting medium would be jeopardized.[4] The beautiful rhythmicality of the anatomic pattern, the increasing index of refraction from the cortex toward the nucleus, the high regularity of the intralental refracting surfaces, all these features are incompatible with major irregularities in growth or proliferation of the lens cells. Age, although inducing many changes, does not impair these properties. The lens cells continue to grow and proliferate until death.

If the aforementioned hypothesis be true, the lens gives cancer little chance to exist in its domain.

Physical factors

Pressure. Cancer cells, when proliferating, infiltrate and push aside adjoining tissues, and the total volume of an affected organ tends to increase. The intralental pressure in the nonaccommodating eye is probably high, a conclusion drawn from the strength of contraction of the ciliary muscle required to overcome the pressure exerted by the capsule on the lens substance.[5, 6]

Although one cell may fail to correspond exactly to adjacent cells—due to slight irregularities in arrangement—it must not be assumed that the resulting, easily demonstrable spaces are empty. These spaces are certainly filled with fluid to insure homogeneous distribution of pressure throughout the lens. Other spaces, such as blood and lymph vessels, do not exist in the lens. It would seem that "wedging in" of cancer cells between normal cells would meet with considerable mechanical resistance from the pressure within the lens.

Light. The retina is protected by the refracting media against damage from ultraviolet radiation.[7] The cornea, because of its thinness, absorbs very little; the aqueous, being noncellular, is biologically inactive; the lens, because of its thickness, absorbs a considerable amount. It is known that ultraviolet radiation promotes conditions which are favorable to cancerous growth.

It may not be too farfetched to conclude that the lens cells are thus naturally adapted to a relatively high dose of ultraviolet radiation, another characteristic held in common with cancer cells. As in anaerobic glycolysis, the lens cell thus meets the cancer cell on the same competitive level, while other body cells, under similar conditions, would be at a distinct disadvantage.

Lens constituents

Minerals. The sodium content of the lens is extremely low. In tumors, generally, the sodium content is increased, but nothing definite is known about the influence of sodium on the growth of cancer.[8]

The potassium content of the lens, on the other hand, is extremely high, but decreases rapidly when cataract develops. Potassium promotes glycolysis. Its presence in large amounts, in both the lens and in tumors generally (where it corresponds with their metabolic rate), may thus be referred to the peculiar energy metabolism of the lens and of cancer respectively.

Protein. There is a questionable decrease of glutathione in the protein found in cancerous growths. In the lens, glutathione is present in significant amounts.

Lenticular protein is unique in that it lacks species specificity, possessing organ specificity only, with an amazing degree of similarity, at least in mammals. This feature

may point to a lower grade of specificity (common to both lens and cancerous tissue), another similarity to cancer.

Enzymes. As mentioned before, the lens cells contain neither cytochrome nor cytochrome oxidase. When cytochrome-c activity of normal human tissues and human neoplasms was compared, cytochrome activity was highest in certain normal tissues and lowest in the tumors of greatest malignancy.[9]

In this study cytochrome-c activity was found to be highest in those tissues in which cancer incidence is least frequent. The lens does not seem to fit into this pattern. In our opinon, however, the absence of cytochrome in the lens and the low cytochrome activity in cancer is one more similarity between lens and cancer, all of which taken together make lens tissue the most direct competitor of malignant tissue.

Other factors

Hydrogen-ion concentration. The pH of the lens is approximately 7.4. At this pH the alpha and beta proteases present in the lens are inactive. If the proteins of the lens break down, the resultant increase in acidity activates the proteolytic enzymes, and the way is opened for large scale hydrolysis of these proteins.[10]

Proteolysis induced by cancer is promoted by reduced oxygen pressure. The oxygen pressure in the aqueous corresponds to only 0.8 to 0.12 volume percent. (The actual volume of oxygen in the arterial blood is approximately 19 cc. percent.) Hence, should tumor cells succeed in becoming established in the lens, it can be assumed that they would exhibit considerable proteolytic activity because of the favorable milieu. The released amino acids would quickly render the reaction within the lens more acid, the mechanism for autolytic decomposition of lens proteins would be released, and swelling and destruction of the lens would result.

Another intereting possibility may be assumed. The lens may not be immune to cancer, but cancer, in its beginnings, may create conditions which tend to destroy the lens before the new growth has advanced to a point where it is demonstrable.

This hypothesis may also be applied to the competition between lens and cancer cells for glycose. If the cells of the lens were deprived of sufficient quantities of glycose for any length of time, the impairment of energy metabolism would soon bring about destruction of the lens.

Summary

Factors of biologic, metabolic, physical, and chemical nature—any or all of which may be responsible for the nonexistence of cancer in the lens—are considered and discussed.

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RECORDING OF VISUAL FIELDS*

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To the busy clinical ophthalmologist, the detailed study of visual fields is frequently an undesirable chore. Too often it turns out to be time consuming and taxes the doctor's patience excessively. Some men even ignore it and others relegate it to the nurse, secretary, or technician. To one who devotes much of his time to this work, it is apparent that the science of perimetry is not to be relegated to a technician. Duggan[1] goes so far as to say that he would condemn such practice as much as that of allowing one's secretary to do the ophthalmoscopic examination.

Some ophthalmologists believe that a very elaborate machine for the study of visual fields does away with the need for the doctor. We must remember, however, that the technique is far more important than the machine. To quote Traquair,[2] "Perimetry is not done by the perimeter, but by the perimetrist, and simple tools properly used are much less productive of wrong conclusions than undue reliance on the dicta of an elaborate instrument." Since the technique of perimetry should be guided by the clinical aspects of the case, one can understand that it would require a clinician to study the visual fields satisfactorily.

TIME-SAVING METHODS

However, since the clinical ophthalmologist may find it too time consuming, it seems pertinent to discuss some of the methods available for time saving and efficiency in recording visual fields.

DICTATE THE FINDINGS

In examining the patient's visual fields on the perimeter, it is best for the examiner to study the successive meridians and dictate the findings to his secretary as he makes them.[3] In this way, the examiner does not waste time looking for the proper place on the field chart, getting a good light to read by in the darkened room, readjusting his own position in relation to the test-object holder, and so forth.

All these distractions are time consuming and tax the subject's patience as well as that of the doctor. Furthermore, taking out time to record interferes with the routine, the patient grows restless and may change his position, and the examiner has to readjust the patient's position for each setting of the perimeter. It is advantageous, therefore, to dictate the findings to the secretary who can insert them on a card previously prepared for this purpose. This card (fig. 1) has the various meridians listed one under the other in the order in which they are examined, and the secretary records the data as the doctor calls them off. There is also provision for object size, distance, and color—all of which are dictated by the perimetrist as he examines.

ROUTINE OF EXAMINATION

For accuracy and uniformity, it is best to start with the 0-degree meridian representing the patient's right horizontal meridian in either eye, and to go up and to the patient's left (that is, clockwise for the examiner as he faces the patient) and, in this order, all the way around the field at 30-degree intervals.

Each meridian is recorded in order, the opposite meridian not being explored at the same time. One finds it less confusing and faster to record each meridian in order, for example 0 degree, 30 degree, 60 degree, and so forth; *not* 0 degree, 180 degree, 30 degree, 210 degree, and so forth.

By following one meridian after the other, the examiner can more easily appreciate the field as it unfolds itself, and thereby adjust

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his technique to the conditions found. Single aberrent readings which differ appreciably from the adjacent readings will attract the examiner's attention and will suggest that the same meridian be explored and that the 15-degree readings on either side be explored as well. If the examiner alternates readings between one side of the field and the other while he dictates to the secretary, he may lose track of the general contours of the field and cannot, therefore, guide his technique as accurately.

If all visual findings are definite and the patient is quite sure of his responses, no qualifying remarks are made in the dictation. On the other hand, if the patient gives a definite description of seeing the test object very blurred in certain areas, such as one would see in an area of relative scotoma, the dictation is given so as to indicate that there is some relative defect in this area.

To illustrate this. If we are exploring the 30-degree meridian in the right field of Figure 2 and the patient sees the test object blurred at 39 degrees and continues to see it blurred until it reaches the 9-degree arc, where it suddenly disappears completely and reappears clearly at the 2-degree arc, this 30-degree meridian would be dictated as "39r,9a,3v"—the small letters "r," "a," and "v" standing for "relative," "absolute," and "vision." The last symbol, "v," indicates clear vision for that portion of the field.

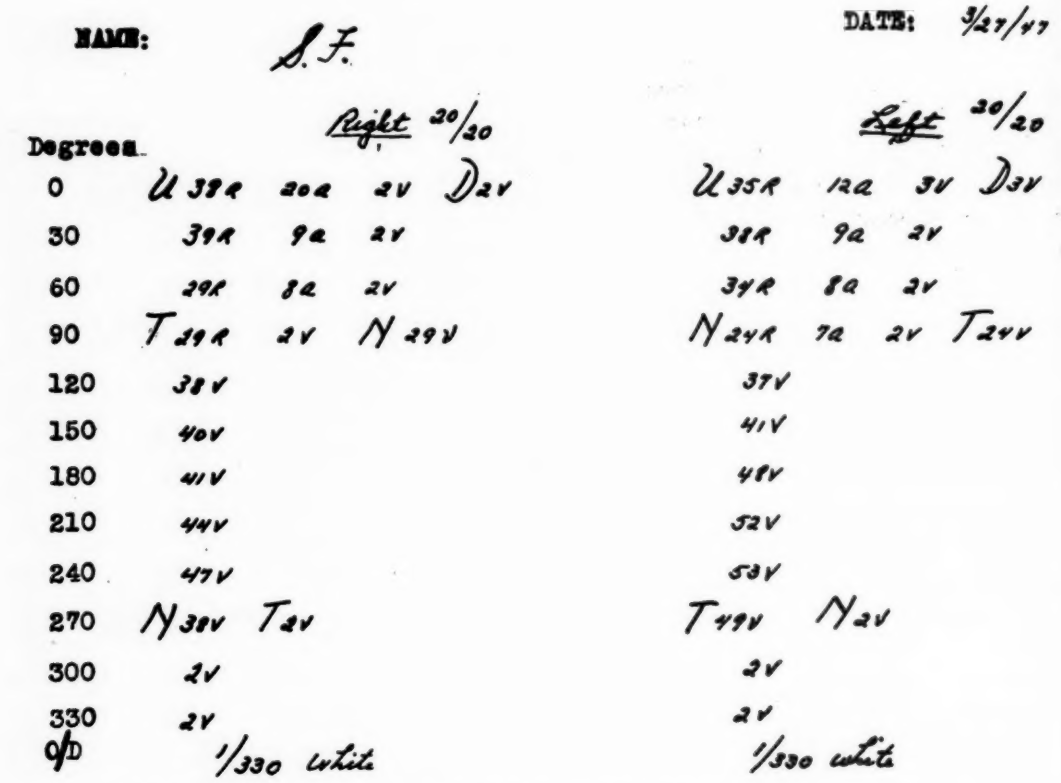

Fig. 1 (Chamlin). Card for recording data for peripheral fields. (The fields in Figure 2 were plotted from the data on this card.)

Checking relative defects

Of course, in evaluating relative defects, one must be quite sure that it is really a defect and not the normal amount of blurring due to the physiologic diminution in visual acuity in the periphery, corresponding to the

normal "sloping edge" of Traquair. One way of checking the area of relative defect is to use the method of "rapid comparisons"[4] and compare this area with one in another meridian about the same number of arc degrees distant from fixation.

For example, if the patient thinks that the test object is blurred between 10-and 20-degrees in the 60-degree meridian, one should move the test object rapidly to the 120-degree meridian between the 10 and 20 degree arcs, and ask the patient to compare the appearance of the test object in the two different places.

The same test object should be seen approximately equally well in these two areas, unless the defect crosses the vertical meridian. In such a case we may use a point equidistant from fixation in the 240-degree or 300-degree meridians.

It is well to make these comparisons rapidly, holding the test object in each of the comparable areas for only a brief second at a time. One should keep asking the patient "is it clearer here or there" and should accept only very definite and consistent answers.

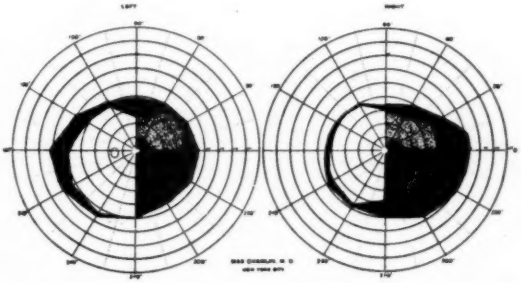

Fig. 2 (Chamlin). These visual fields were filled in from the data recorded on the card shown in Figure 1.

In order to avoid the necessity for moving the arc of the perimeter with each of these rapid changes, it is well to use a paddle type of carrier.[5] With this carrier, which furnishes a large dark background for the test object and simulates the perimeter surface, the examiner merely changes the position of the paddle carrier rapidly from one area to the other, approximating the meridian and arc position rather than actually measuring it on the perimeter. Once the quality of the defect is evaluated in this way, accurate measurements with the perimeter arc in position can be made. In asking the patient to evaluate the test object against the paddle carrier without the perimeter background, it is well for the examiner in his black gown to provide a substitute background.

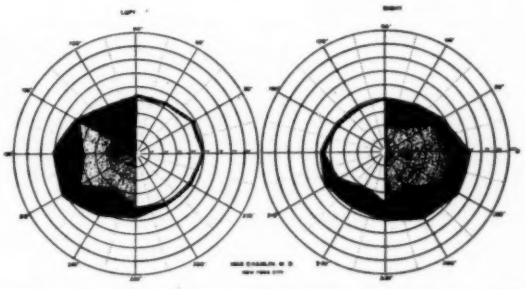

Fig. 3 (Chamlin). Peripheral fields for 1/330 white, showing bitemporal hemianopic defects with varying density.

In the same meridian, one must be careful about labelling a more peripheral arc as relative compared to a more central arc. A pathologic defect is more definite if the test object becomes blurred more centrally after having been seen more clearly peripherally in the same meridian.

Recording of readings

This method of recording vision, relative defect, and absolute defect, as "v," "r," and "a" may seem a little complicated at first, but actually resolves itself into a very simple method of dictation. As another example, in Figure 2, in the 60-degree meridian of the left eye, if the test object was seen blurred at 34 degrees, disappeared at 8 degrees and returned clearly at 2 degrees, the dictation for the 60-degree meridian of the left eye would be "34r, 8a, 2v." These readings are dictated at the time the patient calls them, as the test object is carried along the meridian being explored.

In those cases in which one suspects a

sharp line of demarcation, such as in the temporal hemianopias of chiasmal lesions where the 90-degree meridian may divide a relative or absolute defect temporally from a zone of good vision nasally, the 90-degree meridian is dictated as "T" and "N," standing for "temporal" and "nasal." The readings are taken separately along the temporal and nasal side of the vertical meridian.

Thus, in Figure 3, the 90-degree meridian in the left eye would be dictated as N43, T0. The same designation of "T" and "N" is used for the 270-degree meridian.

Furthermore, if a sharp horizontal division is found between a zone of good and poor vision in any but the vertical meridians, I use "U" and "D," standing for "up" when reading above the meridian and "down" when reading directly below it. These readings, of course, are made directly above and below the line along the middle of the perimeter surface in the meridian being explored. Thus, in the left field of Figure 3, the sharp change from absolute to relative scotoma in the 150-degree meridian is recorded as U0, D48r, 13a. "T," "N," "U," and "D" are inserted as capitals, while the "v," "r," and "a" are inserted as small letters.

Areas of diminished vision

In those areas where the test object is sighted by the patient, but the patient tells the examiner that it is very blurred, one may indicate the area as being relatively scotomatous. Of course, we are not really giving that portion of the field a definite value in terms of visual angle, color, and illumination. We merely describe it as an area of diminished visual acuity as compared to other areas for the same visual angle and illumination.

These areas of diminished vision can be further analyzed with lesser stimuli into absolute scotomas. However, for most practical purposes, merely indicating a definite blurring as a relative defect is highly satisfactory.

Some patients are very keen in their observations and correspondingly expressive in their descriptions of how they see the test object and thereby give us good data for recording various degrees of density of scotomatous areas. However, one should not attempt to record such gradations on the basis of the patient's evaluation of a single visual-angle stimulus. This would lead to too many complicated factors.

It is safer to accept only one degree of vision as being that of a relative scotoma—that area in which the patient definitely sees the object but where it is definitely not as clear as it is in other areas equidistant from the fixation point.

Recording tangent-screen findings

A similar procedure of dictation may be used in recording findings on the tangent screen. Here the markings are in 22.5-degree meridians and corresponding record cards are used when recording fields such as the 1/2,000 white or the 5/2,000 red.

Here again, one can use the symbols, "U," "D," "T," and "N" to indicate sharp dividing lines as well as the letters, "v," "r," and "a" for indicating varying degrees of density of scotoma or vision. By dictating the findings, we can avoid putting pins into the screen, thus saving time, wear and tear, and the distracting influence of the pins on the tangent screen.

Against this method, one might say that, without the pins, the examiner does not visualize the field as it unfolds itself and thereby fails to take extra readings in areas suggesting a defect. However, if one uses the tangent screen fairly frequently, one will easily learn to visualize and interpret the field as he dictates it.

Verbal dictation and recording by the secretary is not particularly useful in mapping out small scotomas. Here, the usual method of inserting black headed pins or a light dab of chalk is preferable.

Advantages of these methods

There are several advantages to this method of recording perimetric and tangent-screen findings.

1. It gives an accurate, numerical record of the patient's field, not affected by the error in recording hastily and interpolating distance for the various arc degrees on a perimetric chart in a darkened room. For future reference and comparison, these original records are most accurate.

2. The patience of the subject is not taxed with boring delays between readings, and consequently he maintains more constant fixation.

3. The entire procedure becomes much more rapid, thus doing away with one of the reasons that some men do not study visual fields more often. The secretary can be taught to plot the fields from these charts within 3 to 5 minutes after recording all data; or she can plot them after the doctor is through with his work, if the findings are not of an urgent nature. It is preferable to see the plotted field before the patient leaves the office, so that any suspicious recordings which might bear checking can be verified.

Visual field charts

There are many types of charts in use for recording of visual fields. Many of them use some shading of the periphery, leaving unshaded that portion usually subtended by a 5/330-white test. If all perimetry were done with this visual angle, the shading would be adequate as indicating the normal. However, with modern methods of quantitative perimetry, using different visual angles, this shading loses much of its value, and to the inexperienced eye, may often be misleading. While the 5/330-white test is satisfactory for marked peripheral defects, it is not quite sensitive enough for minimal types of peripheral defects. For such minimal types of interference, one should use a minimal stimulus, such as the 3/330 white, or better still, the 1/330 white. The last one mentioned, while not reaching out as far in the periphery of the field as the 3/330 white, is a much more delicate test and more apt to show minimal interference in the field, even when quite peripheral.

Chart for peripheral-field study

Therefore, since 5/330, 3/330, and 1/330 all have their uses, I have devised a chart for use at Montefiore Hospital for peripheral-field study with all these three isopters indicated on it in a light contrasting color (fig. 4).

In order to avoid confusion, the meridional- and arc-degree markings are of an orange color, and the normal isopters are indicated in a very light green—so light, that on casual inspection, the examiner will not notice these isopter lines. However, the recorder has no difficulty in seeing and using the line for the particular test employed. The outermost green line represents the 5/330-white field, the next one the 3/330, and the innermost one the 1/330 field. The visual field tracings are done in the usual black ink.

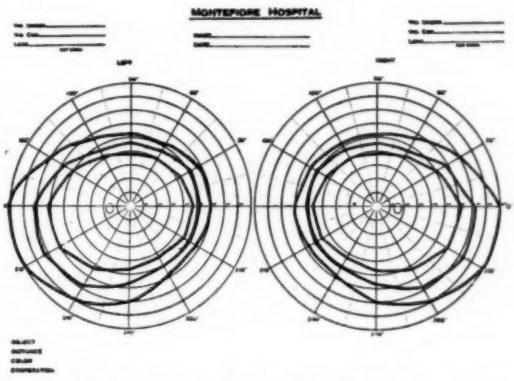

Fig. 4 (Chamlin). Photograph of author's chart for recording peripheral fields. The chart is white and the meridional and arc markings are of a light orange color. All the printing on the chart is also light orange in color. The median normal isopters for the 5/300, 3/330, and 1/300 white are marked off in very light green, hardly perceptible on casual inspection. These isopter lines have been accentuated with heavy black ink so as to show up well in this photograph. The light orange lines have also been changed to black for the purpose of this photograph.

After recording the visual fields, the secretary goes over the isopters for the particular visual angle used in the same black ink. Thus, if we use a 3/330 test, the secretary blackens the middle isopter line, then outlines the field as found for the patient, and

blackens the space between these two lines. Thus, all blackened space indicates lost field.

This method of blackening all the lost field up to the normal isopter is used by many workers for the 5/330 field by blackening up to the shaded area. For smaller visual angles; that is, for the slightly inner isopters, some workers have used the corresponding normals to indicate lost field. Most examiners, however, merely draw the line on the field and do not indicate the normal.

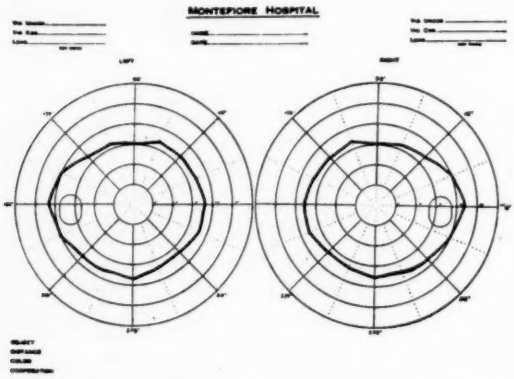

Fig. 5 (Chamlin). Author's chart for central fields. As in Figure 4, all the printing, arc, and meridional markings are in a light orange color. The isopter used for 1/2,000 white, normally a very light green, has been marked with black ink for the purpose of this photograph.

In reading these charts, all the observer has to know is that the outermost blackened line is the normal extent of field for the particular test used. Of course, if the plotted field is larger than the normal one, there is no space to fill in and the normal need not be blackened.

Minimum normal field

To one who has had experience with the various isopters for the various visual angles, this filling in of lost field may not be very important. However, many of the physicians to whom these charts are presented are not acquainted with these normals, and a normal 1/330 field may appear like a generalized peripheral contraction when plotted on a chart whose periphery is shaded for a 5/330 field.

The 5/330 isopter is represented pretty much the same on most perimetry charts and is almost the same as the averages found by Ferree, Rand, and Monroe.[6]

In this same article, the authors studied a large series of normals and worked out what would be a minimum normal field for the 5.8/330 (1-degree stimulus). They conclude with reasonable assurance that a field smaller than this is probably a pathologic contraction.[7]

This minimal normal field takes into consideration even the smaller fields of presbyopes. When considering only myopes and presbyopes, the average field was found to be not more than 10 to 12 degrees narrower than the normal used on the Montefiore chart. Therefore, any contraction beyond 12 degrees on this chart should be considered as probably induced by a pathologic condition.

The 1/330 isopter used on the Montefiore chart is practically the same as the median value given by Ferree, Rand, and Monroe for 150 nonpathologic cases. These authors worked out the lowest normal field for this visual angle (0.17 degrees) including the fields of presbyopes.[8] The greatest difference between the 1/330 isopter on the Montefiore chart and the smallest field for presbyopes is about 10 degrees nasally and 17 degrees temporally. Therefore, any contraction beyond 12 degrees on the 5/330 isopter and beyond 10 degrees nasally and 17 degrees temporally on the 1/330 isopter should be considered suggestive of pathologic conditions.

Interpretation of fields

In general, if the field is uniformly constricted, it is unlikely that one is dealing with a true pathologic contraction. On the other hand, localized indentations and sector defects are much more common in truly contracted fields. Of course, in any doubtful cases, one should expect the emmetropes and hyperopes to have larger fields, and the myopes and presbyopes, smaller ones. A truly technical normal could be established by

working out a long series of fields depending on the refractive error as well as the age. However, if one wants to feel very safe before considering a field contracted, he may do so by using these low normals as worked out by Ferree and Rand.

One may assume other normals than those assumed normals as fairly reliable, especially, as in this case, when the smaller halves of each field are homonymous and the clinical picture warrants a homonymous field defect. However, if the findings do not give a clue, one could well use the median normals on these charts as a guide.

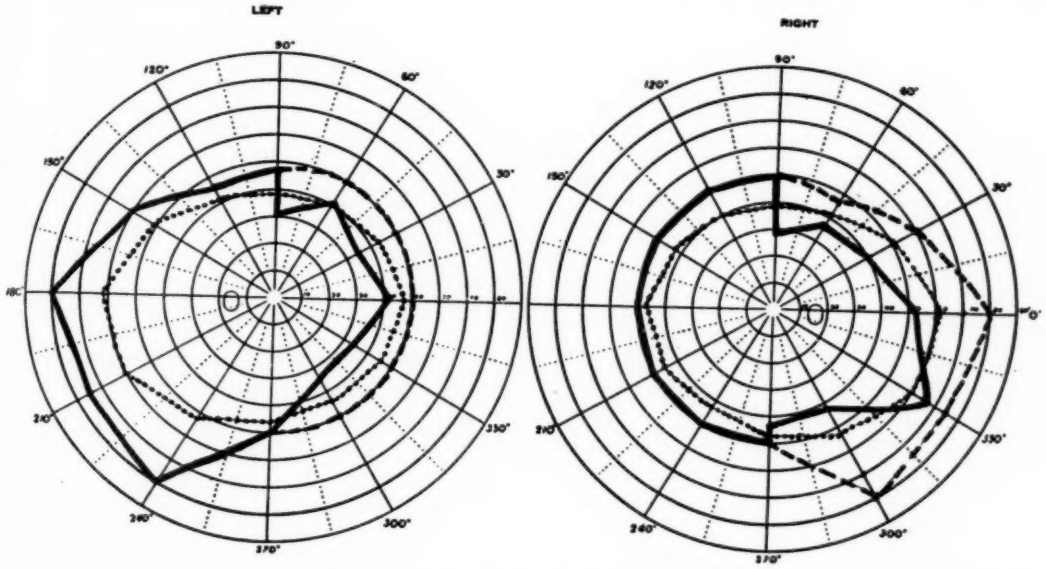

Fig. 6 (Chamlin). The solid heavy black line is the field plotted for A. R. with 1/330 white. The dotted line represents the median normal for this visual angle as used on the author's chart.

In this case, the extent of the normal field in the homonymous defective area of the right eye may be assumed by the broken line which is filled in from the corresponding normal field in the left eye.

That is, the normal for the right temporal field is plotted by a broken line by using the corresponding fuller temporal recordings in the left field. The normal for the left nasal field is plotted by a broken line using the corresponding fuller nasal recordings in the right field.

It is reasonable to assume that the right and left normal fields are equal in size and shape, since both eyes had equal visual acuity and equal refractive error. It will be seen that these assumed right homonymous normals follow the general contour of the fuller, normal, left homonymous recordings.

This is the field study in a case of left temporal lobe lesion with beginning right homonymous field defect.

reported on the charts by the findings in a particular case. For example, in Figure 6 we see that the left half of each field, being unaffected by the interference of the visual pathways, shows an extent of field well beyond the 1/330 isopter shown on my chart. In such cases, we may assume the normal field to be represented by the less affected temporal and nasal halves. One could, in such cases, gauge the normal or the general contour of the fuller size of the field with reasonable accuracy. One may consider such

In similar fashion, the Montefiore chart for central fields has a normal isopter for 1/2000 white indicated on it (fig. 5). Here again, the arc and meridian markings are colored a light orange and the 1/2,000 isopter is a very faint green. The values for this 1/2,000 isopter were made after Hefftner and discussed by me in a previous article.[5]

According to some observers, the normal 1/2,000 field extends for an average of about 19 degrees while, according to others, it may extend to about 26 degrees.[9] The author has

found many patients who do not perceive the 1-mm. test object at two meters beyond the 10- to 12-degree meridian. This is in accordance with the findings of McLean.[10]

If a patient's 1/2,000 field reaches uniformly about 10 degrees all around fixation and no other peripheral or central defect can be found, it is quite likely that this is the

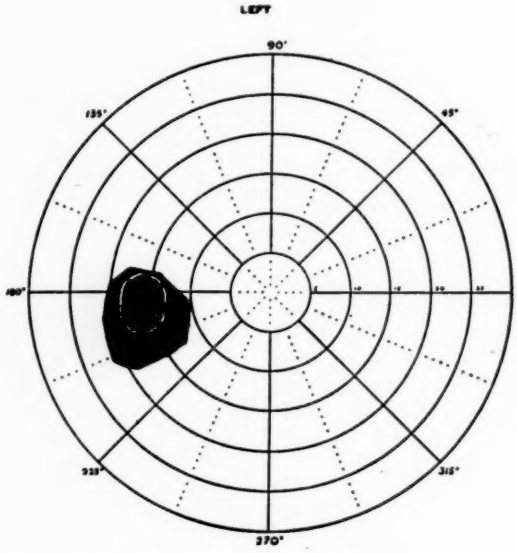

Fig. 7 (Chamlin). Black and white reproduction of an enlarged blind spot. An orange line outlining the normal blind spot on the chart is left unblackened and stands out against the black of the enlarged blind spot to show the normal area.

normal for him. Thus, we must make allowances for a wide range of normals as in the peripheral field. Here, again, localized contractions such as homonymous or bitemporal defects are much more significant than generalized regular contractions.

Show up normal blindspot

The 45-degree meridians are marked off by solid lines to the 5-degree arc and then by dotted lines. The 22.5-degree markings are represented by dotted lines and stop at the 5-degree arc. This allows more space centrally for detailed recordings. The unmarked meridians within the 5-degree arc can be gauged with reasonable accuracy. The blind spots are calculated according to the average of Evans' report on five workers.[11] When filling in the blind spot demonstrated by perimetry, it is well to show up the normal blind spot within it so that the physician can easily gauge the amount of enlargement, if any. This can easily be done by not blacking the outline of the normal blind spot (fig. 7). Here, the orange color outline of the normal blind spot is left intact to stand out, as normal, against the blackened area.

Recommended charts

The charts are printed on white thin paper so that the black ink shows up well and can easily be traced from another field record if necessary. The light orange and green markings become inconspicuous next to the black recordings and the latter stand out well. These charts are useful for hospital and office records, and especially for demonstrations to large groups at clinical conferences. However, for reproducing field studies in medical publications, it is better to use black meridional markings and to trace the normal isopters used from another chart before filling in the space representing lost field. I have used such charts in this article.

Summary

1. A rapid method of recording visual fields is described. This method allows the examiner to work rapidly, uninterruptedly, and accurately while he dictates his findings to his secretary.

2. This method gives a permanent, accurate, numerical record of the visual-field studies, together with a simple method for recording differences in scotometric densities.

3. The Montefiore charts for central and peripheral fields are described. These charts carry the commonly used normal isopters in light colors so the proper ones can be utilized in indicating lost field, thus making the finished chart a schematic picture of the subject's visual field and its deviation from the normal.

1840 Grand Concourse (57).

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THE STEREOPHOTOGRAMMETRIC STUDY OF THE ANTERIOR SEGMENT OF THE EYE*

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An historical study of contact lenses and their development from the time of Fick, that is about 1888, to the present, leads to the conclusion that in order to make a perfectly fitting contact lens, a faithful reproduction of the curves of the anterior segment of the eye must be obtained.

The drawbacks to the standard lens, that is, with fixed curves, have been partially solved by using a cast of the eye but this procedure does not fulfill all the necessary requirements and presents unsolved difficulties which will not be discussed in this paper since they are well known to all those who have made a particular study of contact lenses.

The ideal lens is that which would rest on a large surface of the ocular conjunctiva. For this, it is necessary to try to obtain with the maximum exactitude a pattern of all the curves of the anterior segment of the eyeball, covered by the conjunctiva so as to avoid compression of the vessels and subconjunctival capillaries which feed the cornea and perilimbic region.

Dallos, to whom the first results of this study were communicated, is entirely in agreement as to the necessity of obtaining these curves; he maintains these curves should be of such exactitude that the margin of error would not exceed 0.05 mm. (personal communication).

Stereophotogrammetry consists in the calculation of the form, dimensions, and position of a given object from photographs of the same. It is a highly specialized subject in engineering which can only be practiced by skilled technicians. The author is indebted to the collaboration of A. Saralegui, an engineer, whose knowledge has given the solution of many of the problems arising in the course of this work.

It has already been stated that the curves to be obtained are those which form the anterior segment of the eye, covered by the

* Read before the II Pan-American Congress of Ophthalmology, Montevideo, Uruguay, November, 1945.

ocular conjunctiva. The transparency of the conjunctiva, which makes it invisible on a photographic plate, is a great drawback. This was the first difficulty to be solved. Several methods tried gave negative results until the eye was powdered with lamp black. This method gave a satisfactory result; that is a perfect stereoscopic view of the conjunctival and corneal surfaces. The fine film which covers the anterior segment of the eye, the vessels which run under it, and even the sclerotic could all be seen.

The fundamental problem thus solved, it was possible to chart the points of observation necessary for the stereophotogrammetric measurements which enable one to plot the curves made by the conjunctival surface of the anterior segment of the eye millimeter by millimeter throughout the whole of its extent.

The technique was as follows. After the administration of akinesia and local anesthesia, the eye was powdered with lamp black, by means of a strainer; the lids were then separated and a snapshot was taken with a Zeiss stereoscopic camera of the anterior segment of the eye. This camera has orthoscopic objectives, its own illumination, and a focusing eyepiece. The photographic plates gave negatives which permitted the eyeball to be measured within the preëstablished limits of error.

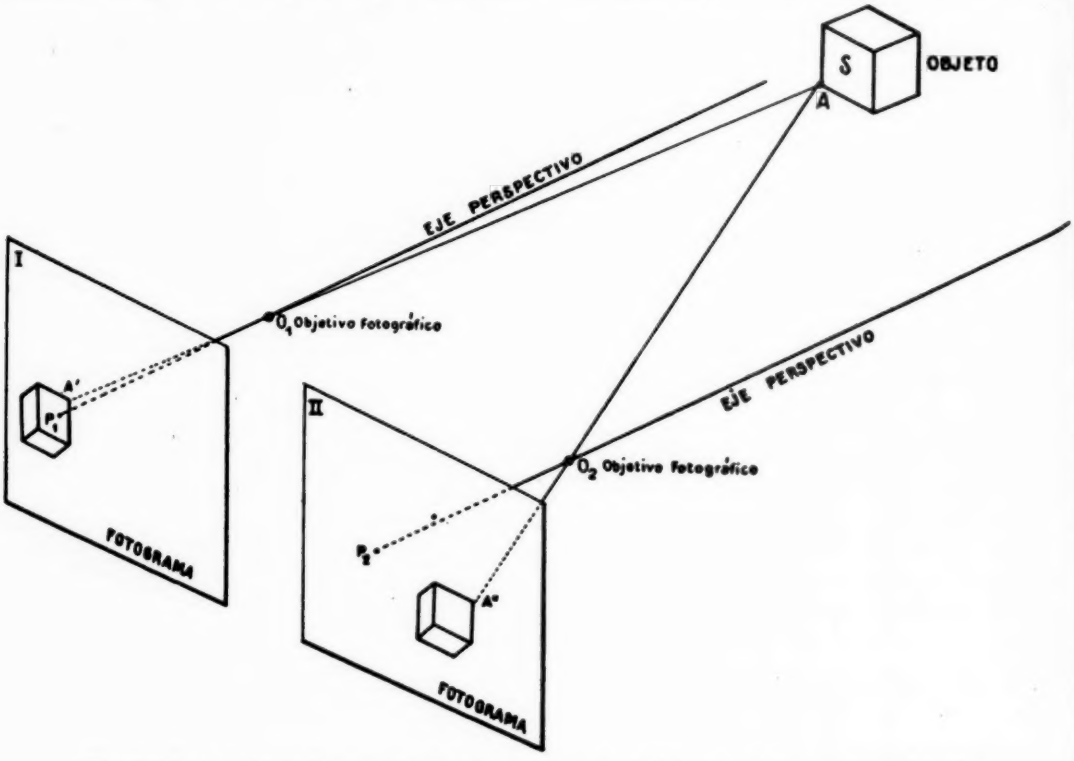

Fig. 1 (Bertotto). A diagram of the simplest way in which two photograms can be taken.

These stereoscopic photographs, from now on referred to as photograms, provide exact and different views of an object. In stereophotogrammetry, two photograms of an object are needed to reconstruct the object in three dimensions. It should be noted that the two photograms must be different; that is, taken from two different points in space, of which the relative position as well as that of the main axes of the perspectives must be accurately known; the greater this accuracy the more exact will be the reconstruction.

Figure 1 is a diagram of the simplest

way in which two photograms can be taken. These have been marked I and II. Their principal points are P_1 and P_2. The positions in space from which they are taken are O_1 and O_2 and the main axes of the perspectives are $O_1 P_1$ and $O_2 P_2$.

Figure 2 illustrates how any point, A, of the object, S, is reconstructed in space A_1, by placing the two photograms, I and II, exactly in the relative position they held at the moment of being taken, and materializing in any way (either optically or mechanically) the beams AO_1 and AO_2, which produce A_1 at their intersection.

It is obvious that in solving the problem by mechanicoptical method or by calculation, the accuracy of the reconstruction of A_1 corresponding to A will depend on the delicacy with which $A'O_1$ and $A''O_2$ have been materialized or in what way the segments P_1A' and P_2A'' have been measured. This last also necessitates the knowledge with the utmost precision of the distances of d_1 and d_2 of the photographic objectives as well as the separation of their posterior nodal points.

Having obtained the foregoing data, the numerical solution of the problem is obtained by a simple equation of proportion. The figures which are known in order to find the unknown; that is, the reconstruction of point A in space (D_A) are the following:

$$d_1 = d_2 = d$$
$$O_1 O_2 = b$$
$$P_1 A' - P_2 A'' = P_A$$

with these data, the following equation can be made:

$$\frac{D_A}{b} = \frac{d}{P_A} \text{ which gives } D_A = \frac{b \times d}{P_A}$$

Dispensing with the numerical calculation, these photograms were later made by the most perfect stereophotogrammetric instrument known up to the present—the Wild A5 Autograph. The exceptional scope of this instrument has made it possible to draw with extraordinary rapidity transverse and frontal (annular) sections of the anterior segment of the eyeball traced automatically millimeter by millimeter.

The mathematical study of the condition under which the photograms were made and the automatic reconstruction as well as the measured proofs made by the automatic counters of the wild A5 Autograph, make it possible to be certain that the alteration

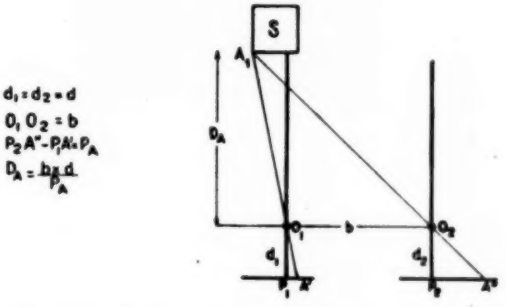

Fig. 2 (Bertotto). This illustrates how any point, A, of the object, S, is reconstructed in space at A_1, by placing the two photograms, I and II, exactly in the relative position they held at the moment of being taken.

in the reconstructed points is less than 0.02 mm. or to be even more exact 0.017 mm. This degree of accuracy will certainly be improved upon in further studies.

Study of the curves obtained by stereophotogrammetry

The camera used takes a stereoscopic photograph with an approximate ratio of 2 to 1, or double the natural size of the eye. Figure 3 is a photograph showing the conjunctiva and cornea powdered with lamp black. The position where the section must be made by the Wild A5 Autograph has been marked by a white line. Underneath the stereoscopic photograph there is a drawing showing the natural size and another three times larger (3 : 1).

In Figure 4, the distance of the different points which make up a curve are related to a plane parallel to the photograms. The measurements can be obtained in thousandths of a millimeter and at any point desired on the curve. Only a few measure-

ments taken at haphazard were established in this diagram.

Figure 5 shows an annular graph; that is, the sections were made in the frontal plane. The circular curves correspond to a section made at a determined distance from a plane similar to that which was referred to in the previous figure, and each line corresponds to a millimeter of the photographed object going from the periphery to the center. At the side in the same figure is a diagram of its projection on a plane, with the object of making the explanation simpler. The curve obtained by joining the several projected points will correspond to a section of the eye which passes through the center of the pupil.

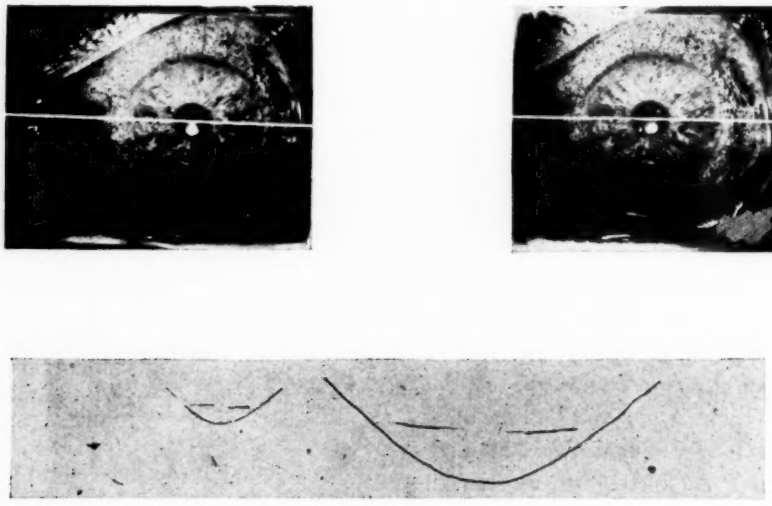

Fig. 3 (Bertotto). This shows the conjunctiva and cornea powdered with lamp black. The position where the section must be made by the Wild A5 Autograph has been marked by a white line. Underneath the stereoscopic photograph there is a drawing showing the natural size and another three times larger (3:1).

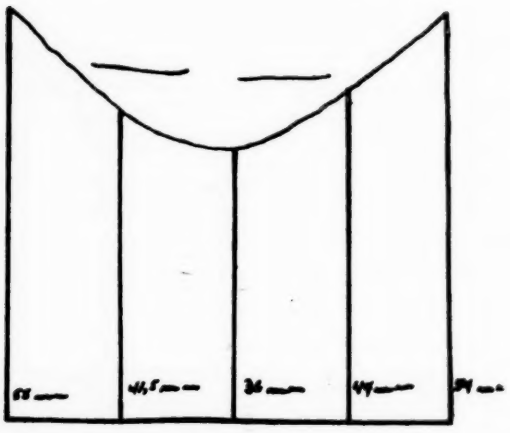

Fig. 4 (Bertotto). The distance of the different points which make up a curve are related to a plane parallel to the photograms.

Figures 6 and 7 are important as they emphasize the number of serial sections of an eye, which can be made and which can be increased if necessary; they also demonstrate the need of powdering the eye. This series of curves corresponds to transverse sections through the eye from the upper part; namely, that which covers the superior segment of the eye, to the lower part of the same, passing through the center of the pupillary area; the distance between each line corresponds to one millimeter in height.

In Figure 6, the eye had been well powdered, so the necessary points for the stereophotogrammetry were obtained both in the conjunctiva and the cornea. A study of the graph shows that the curve passes from the conjunctival surface to the cornea without apparent signs of transition. In Figure 7, the cornea had not been powdered

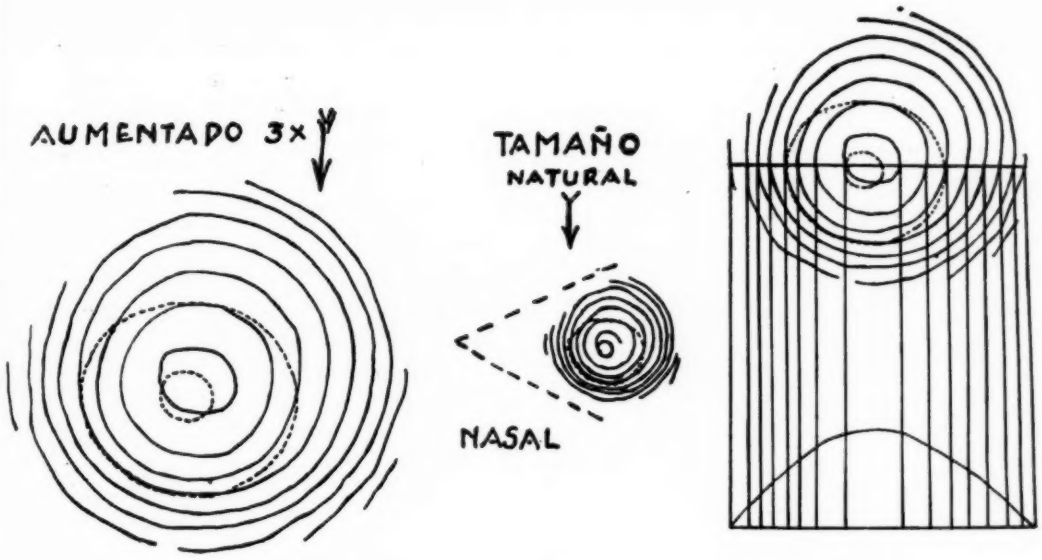

Fig. 5 (Bertotto). An annular graph with the sections made in the frontal plane.

and, therefore, since it is transparent, it has not appeared in the autographic examination. Since the distance between each section is 1 mm., it is easy to deduce that the vertical diameter of the cornea is 12 mm.

The object of Figure 8, is to demonstrate the various planes which can be obtained from a section with the Wild A5 Autograph. It represents three sections of the eye, amplified six times, and with a difference of 3 mm. in height between each section. The middle section is the one which passes approximately through the center of the pupillary area.

Examining this figure, one sees in the first place the bulbar conjunctiva and the anterior aspect of the cornea as obtained by the method under discussion. Immediately behind the curve made by the conjunctiva, there is a second curve which corresponds to the surface of the sclera; its central part, well separated from the curve of the cornea, represents the surface of the iris. In the central section, the posterior line is interrupted in its middle part where it corresponds to the pupil.

At this point attention must be drawn to the fact that the values given to the scleral

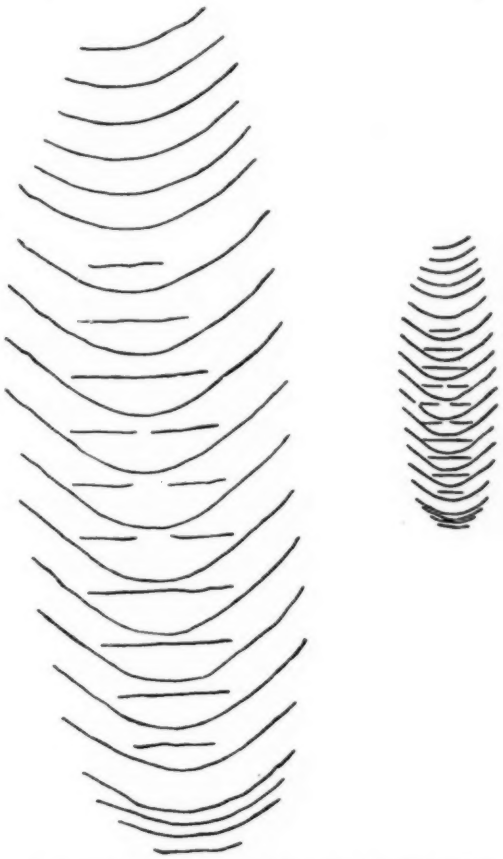

Fig. 6 (Bertotto). A study of the graph shows that the curve passes from the conjunctival surface to the cornea without apparent signs of transition.

curve and those of the surface of the iris are not accurate as no study has been made of the parallex or corneal refraction.

Figure 8 corroborates the importance of powdering the eye with lamp black, since

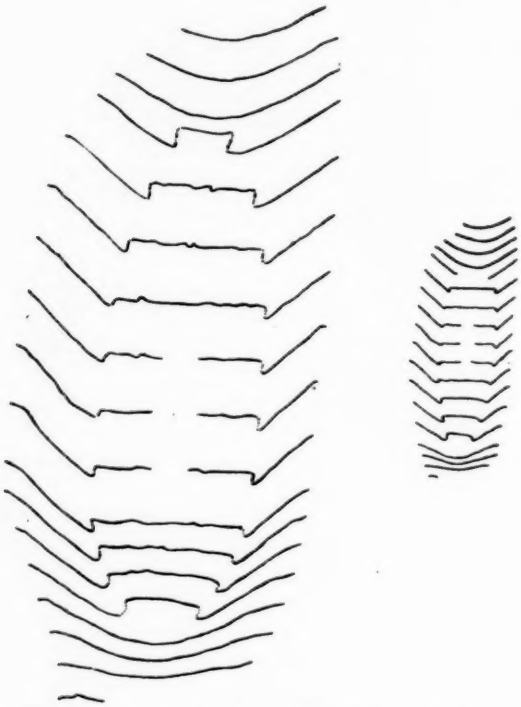

Fig. 7 (Bertotto). Since the distance between each section is 1 mm., it is easy to deduce that the vertical diameter of the cornea is 12 mm.

it demonstrates the separation between the surfaces of the conjunctiva and sclera. It also shows the importance of the surface taken as the base in making a contact lens because, if the sclera is taken, there will certainly be pressure on the vessels and subconjunctival capillaries with subsequent disturbances due to the resulting anemia.

Discussion

The majority of ophthalmologists specializing in contact lenses have abandoned the use of standard lenses, having found that a lens made on a cast of the eye affords greater probabilities of success. There is no doubt, however, that the problem is far from being solved owing to the difficulty of obtaining a perfect pattern or negative of the eyeball which if successful makes the manufacture of the contact lens relatively easy.

Without lessening the importance that casts of the eye have had in the development of the study of contact lenses, Town's opinion on their value can still be fully endorsed: "In the best of cases it is only possible to obtain a defective approximation of the eye." (*Archives of Ophthalmology*, 1940, volume 22, page 822.)

The truth is that a cast of the eye presents certain difficulties among which can be

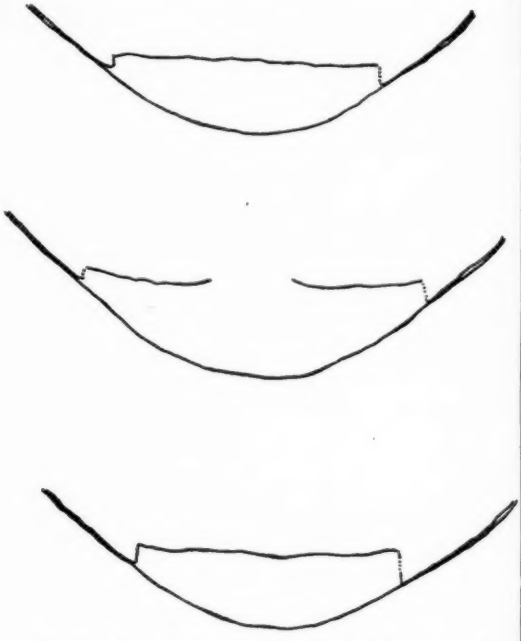

Fig. 8 (Bertotto). The object of this illustration is to demonstrate the various planes which can be obtained from a section with the Wild A5 Autograph.

mentioned: (1) Movements of the eyeball during the taking of the impression; and (2) conjunctival folds and pressure exerted on the ocular tissues.

These inconveniences are eliminated by stereophotogrammetry because there are no movements of the eyeball since the photograph is taken instantaneously, the time employed being 1/25 to 1/50 of a second. It is believed that even more rapid snapshots might be obtained if fresher plates of

greater sensitivity than those used in this study could be employed.

The conjunctival folds and pressure on the eyeball are also eliminated by this method as the only direct manipulation of the eye is the separation of the lids, the facial nerve having been previously paralyzed so as to avoid the defensive contraction of the orbicular muscle of the lids.

Apart from the great advantages which have been mentioned, the method assures that the resulting measurements will have a maximum error of only 0.02 mm. which will be improved upon as the technique is perfected, and which it is believed can be considered negligible in the manufacture of the lens, as it must rest completely on the whole surface in a uniform manner. When the contact lens follows the curves of the eyeball in their slightest detail, it will not easily become laterally displaced or rotate on its interoposterior axis. Also by this method the diameter and exact height of the cornea can be faithfully determined in any meridian desired. With all these exact data, it should be possible to obtain in all contact lenses uniform application over the perilimbic area and a perfect adaptation between the posterior surface of the lens and the vertex of the cornea.

The small number of experiments it has been possible to perform do not allow more definite conclusions as to the advantages of stereophotogrammetry applied to the anterior segment of the eyeball. When the plan of study was sketched out, it was divided into three parts as follows:

1. The obtaining of the curves which made up the anterior segment of the eye—a problem which can be considered as solved, even though it is necessary to perfect the photographic technique.

2. The transference of the curves into three dimensions; that is, the making of the cast of the eye is still being studied. The practical problem has been solved, the photocast having been obtained, but the optic part must be confirmed.

3. Having obtained the cast of the eye, a perfect fitting contact lens must be made. This last phase of the problem has not yet been approached but it should be the easiest, because of the advances which have been made both in plastics and in the manufacture of lenses.

Conclusions

1. A new method of obtaining all the curves which make up the anterior segment of the eye based on the application of stereophotogrammetry to ophthalmology is presented.

2. It is absolutely necessary to powder the eye with a contrasting medium because of the transparency of the conjunctiva and cornea.

3. The results obtained have been better than were expected since the margin of error is only 0.017 mm.

4. This method should be of great value in the manufacture of contact lenses.

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THE OCULAR SYNDROME OF CATARACT AND PAPILLEDEMA IN THE MANIFEST FORM OF PARATHYROID DEFICIENCY*

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A white woman, aged 53 years, was referred because of failing vision. Her medical history previous to her 49th year was irrelevant. At that time she had undergone a thyroidectomy. Since the operation she had lost her hair, her skin was dry, and her nails were brittle. Her chief concern was her dimming vision. She said that she had been given calcium following the operation but she had not taken any for the past year.

Eye examination revealed vision to be: R.E., 20/200, corrected to 20/100; L.E., 20/50, corrected to 20/40. Diffuse posterior subcortical opacities were found in both lenses. The fundi were still discernible and appeared normal. The pupils were equal and reacted normally to light and accommodation. The extraocular muscle balance was normal. The visual fields were normal. There was a slight elevation of the intraocular pressure above the upper limit of normal.

Diagnosis. Because of the history and the presence of a cortical type of cataract, a tentative diagnosis of postoperative parathyroid deficiency was made. A calcium test showed 8.1 mg. per 100 cc. of blood. Miotics were prescribed, and the patient was returned to her physician, who was asked to make further tests to substantiate the diagnosis. In addition to the low calcium, positive Chvostek and Trousseau signs established the diagnosis of latent parathyroid deficiency.

During the three-year interval between the first examination and the cataract extraction, the lens opacities increased to maturity with loss of useful vision. The intraocular pressure fluctuated, apparently rising with the reduction of calcium and falling when the calcium returned to a normal level. At first, the impression was that the increased intraocular pressure was induced by a primary noninflammatory glaucoma. Later, a secondary type of glaucoma, the result of disturbances from the same causes which led to the development of the lenticular opacities, was thought most likely, due to the fact that the pressure fluctuated with the calcium-blood balance.

Cataract operations. The cataract was removed from the right eye by an intracapsular operation with no complications. The immediate convalescence was uneventful and a corrected vision of 20/30 was obtained within six weeks. After this time, the intraocular pressure began to cause steaming of the cornea. The tension was controlled by a cyclodialysis operation. Later, a keratoconjunctivitis produced a permanent opacity in the center of the cornea. This may have been a type of parathyroid lesion described by Leonard[9] or may have been the result of the corneal damage from the glaucoma or from the frequent tonometric instrumentation. The corrected vision was reduced to about 20/70 as a result of the complications. Throughout the postoperative period, the fundus appeared normal.

Four months later, the cataract was removed from the left eye. Just prior to this operation, the calcium level was determined and found at 8.6 mg. and raised to between 9 and 10 mg. per 100 cc. of blood. Again the operation, as with the right eye, was uncomplicated, and the hospital convalescence was uneventful until the ninth day, when the following episode occurred.

Complications. The patient, lying in bed, was heard to emit a loud, piercing scream and was found in a generalized convulsion lasting approximately four minutes. Dyspnea and cyanosis followed but disappeared within the hour, leaving the patient in a

* Presented at the 83rd annual meeting of the American Ophthalmological Association, Hot Springs, Virginia, June, 1947.

mentally confused state for the balance of the day.

This was the first that was known of any generalized or local spasm or convulsion. However, inquiry of the husband revealed the fact that there had been about six apparently similar seizures during the past five months but he had made light of them with his wife, as she was "too nervous as it was." He had not told his doctor. The family physician was aware of the attacks for the first time when told of the hospital convulsion. Shortly after returning home, the patient had several seizures, one of which was witnessed by the family doctor who likened it to that of idiopathic epilepsy.

Postoperative examination. Upon returning for the postoperative examination, the patient seemed quite confused, disturbed, and blind, save for poor light projection. Ophthalmoscopic examination revealed clear media but a papilledema of considerable amount with parapapillary venous engorgement without hemorrhages. Visual fields were markedly constricted, a small central area remaining. At first it was believed, because of the mental state of the patient, that the poor vision and constricted visual fields were exaggerated. But repeated examinations during the course of the ensuing week gave the same results. Papilledema was also found, although seen indistinctly in the right eye, with loss of sight and constricted fields. X-rays of the skull, orbit, and intracranial contents were normal.

Neurologic examination. The patient was referred to a neurologist. His first office examination was not conclusive enough for diagnosis and the patient was hospitalized for further study.

During the three weeks after the last cataract operation, the patient's behavior changed. Mental symptoms appeared, with nervousness, change of temperament, irritability, and irrational periods. During this time, several attacks of generalized convulsions were reported. During the 24 hours prior to hospital admission, there was continuous twitching of the entire body with spasms of fingers and toes, and generalized convulsions and involuntary defecation were reported. On the day of admission, the calcium was at 6.5 mg. and the phosphorus at 2.35 per 100 cc. of blood. The white blood count was 15,700, the red 4,220,000. All other laboratory tests were negative.

Outcome. Immediate improvement began with the administration of dihydrotachysterol and calcium lactate. Convulsions and twitching ceased after the first day. The mentality cleared. The visual fields improved and the papilledema, though still present, seemed at the end of the first week to be reduced. Vision in the left eye, at the end of the first week, had improved somewhat. There may still be further improvement, although some pallor of the disc has appeared.

Cataract of parathyroid deficiency

The cataract produced by parathyroid deficiency is of relative frequent occurrence and has been reported extensively and in detail by ophthalmologists who specifically have recorded normal fundi in many instances. The ocular syndrome of cataract and papilledema is rare, having been reported in the literature infrequently. Albrecht collected eight cases and added one of his own.[1] Barr and his co-workers reported two cases.[2] Leonard reported one case and referred to seven others.[9] Lillie reported a case having "optic neuritis and cataracts."[10] The patient whose history is herewith presented brings the total to 21 cases.

The probable reason for the rarity of papilledema in parathyroid deficiency is the fact that the severity required to produce this condition is seldom encountered. Perhaps it is occasionally overlooked.

Causes of parathyroid deficiency

There are several causes of parathyroid deficiency. Sufficient for the purpose of this presentation is the classification into idio-

pathic and postoperative types. The idiopathic type may be the result of lack of growth or degeneration of the glands. Intoxication may play an uncertain role. Infections, local or general, hemorrhage, and factors which may cause an inactivation of the products of the parathyroid glands may result in parathyroid priva.[15]

The exact action of the reduced functioning of the parathyroid glands upon the body structure, resulting in the varied symptoms, is unknown. There is an increase in the neuromuscular irritability which is reflected in both the somatic and visceral systems. The ectoderm, both somatic and neural, is affected. The condition exists in the latent and in the manifest stage and may occur in an acute, subacute, or chronic form.

Symptoms of latent stage

The latent stage shows symptoms of excitability only upon local nervous stimulation or irritation and is usually restricted to the muscle or muscles innervated by the nerve stimulated. This stimulation may be artificially induced, as is seen in the tests used for the purpose of diagnosis. It may also be the result of local irritation or inflammation, as is seen in the spasm of the eyelids and face and probable ciliary spasm following eye operations. The most common reaction is the spasm of the striated somatic musculature. Usually, with the latent stage, there is an involvement of the surface ectodermal structures.

Symptoms of manifest stage

The manifest stage is characterized by generalized spontaneous convulsions, possibly of central origin, in addition to the ectodermal changes and the symptoms of neuromuscular irritability which may appear spontaneously. The manifest stage also introduces the neuroectodermal symptoms: mental disturbances, increased intracranial pressure with papilledema, and increased cerebrospinal fluid pressure. The few autopsies performed upon these patients revealed the presence of generalized cerebral edema.[1, 11]

Diagnosis of parathyroid deficiency

The diagnosis of parathyroid deficiency in either latent or manifest forms is made through laboratory tests of the blood calcium and phosphorus and through signs of excessive neuromuscular irritability elicited through clinical tests and symptoms of ectodermal (both surface and neural) involvement.

The normal calcium content of the blood varies within the limits of 9 and 11 mg. per 100 cc. Usually, in latent tetany or parathyroid deficiency, the level is about 7 to 8; in manifest tetany from 4 to 6. The phosphorus content, which normally is between 2 to 4 mg. per 100 cc. of blood, is relatively or absolutely increased in proportion to the calcium content.

Clinical symptoms and tests

The usual tests made to determine the hyperneuromuscular excitability are:

1. Chvostek's sign, which shows the hyperexcitability of the muscles innervated by the facial nerve when it is tapped just anterior to the tragus of the ear above the condyloid process of the mandible (the point of injection for O'Brien's akinesia). The response is a momentary contraction of the facial muscles, including those of the eyelids.

2. Trousseau's sign (or phenomenon) is produced by pressure upon the brachial artery at the bend of the elbow, resulting in a contraction of the hand and fingers.

3. Erb's phenomenon is the result of neuromuscular response to a weaker galvanic current than is usually required to produce a normal reaction.

There are other tests and signs of lesser importance. The clinical symptoms are:

Ectodermal trophic changes resulting in alopecia, dry skin, brittle nails, ridged teeth, and cataract.[7]

Causes of lens changes

Authors differ as to the causes of lens changes. Some attribute them directly to tetanic convulsions with possible ciliary spasm. However, these lenticular changes have been seen in patients in which there have been no local or general spasms. Others attribute the lens opacities to the result of low calcium or lack of specific parathyroid secretion.[6]

The opacities usually begin as individual points in the cortex beneath the posterior (occasionally the anterior) capsule of the lens which develop into threads and riders, finally coalescing. A few crystal-like opacities of denser appearance may be present. In the idiopathic form, which may be seen in the young, possibly acquired congenitally, opacities may be seen deeper in the cortex, evidence of involvement during the developmental stages of the lens.[12]

These lenticular changes somewhat resemble, and therefore should be differentiated from, those produced in diabetes and other toxic conditions and from types of radiation, myxedema and other dermatogenic cataracts.

Neural symptoms

The neural (neuroectodermal) symptoms are:

1. Spasms which may be local or general. They may be induced for purposes of diagnosis. They may be the result of irritation or inflammation or they may be spontaneous, in which case they are usually found in the manifest stage.*

2. Sensory affections of tingling, boring, or numbness may be complained of.

3. Symptoms of irritability, headache, and dizziness may be present.

4. Convulsive seizures or epileptiform attacks occur.

5. Mental disturbances may be present with depression, dullness, and personality changes.

6. Symptoms pointing to hypothalamic affection have been reported.[16, 17]

Accompanying these symptoms indicative of cerebral involvement, increased intracranial pressure, as is evidenced by brain edema, papilledema, and increased cerebrospinal fluid pressure, is found.[1, 11]

X-ray films frequently show symmetrical shadows in the area of the basal ganglia. Blood vessels in the vicinity may at first be surrounded by colloid deposits which undergo calcification.[6]

Other symptoms of apparently lesser diagnostic importance, including extrinsic ocular muscular weakness and eyestrain, strabismus, nystagmus, and anisocoria, have been reported. Spasm of the ciliary muscle and iris is found. The smooth muscles innervated by the autonomic nerves are probably more frequently involved in tetany than is commonly appreciated.

Differential diagnosis

Differential diagnosis must be made from idiopathic epilepsy and brain tumor. The former may be the tentative diagnosis of the general practitioner who first sees the patient in convulsions. The latter may be the diagnosis of the neurologist who sees the patient's confused mental state, with convulsions and increased intracranial pressure as evidenced by papilledema and increased cerebrospinal fluid pressure.[1, 11] Perhaps, as there is rapid loss of vision along with swelling of the optic-nerve head, the ophthalmologist may consider optic neuritis along with papilledema in the ophthalmologic diagnosis.[10]

Conclusion

The reason for this presentation lies in my desire to recite my clinical experience and to review the pertinent literature of this con-

* A patient is recalled who, about two hours after cataract extraction, suffered extreme local pain with spasm of the facial muscles and of the eyelids and probable ciliary spasm with redness and profuse lacrimation, evidently as a result of irritation induced by the operation. She had undergone thyroid operation several years before and had developed tetany cataracts.

dition. If there is anything of worth to be gained from the report of this case, I believe it is revealed in the necessity of keeping all patients with parathyroid deficiency under constant surveillance in order to prevent the latent affection from becoming manifest.

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THE EXTRACTION OF CATARACT IN THE PRESENCE OF FLUID VITREOUS*

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Nearly all cataract surgeons have had experiences with the complication of fluid vitreous which has replaced the normal gel vitreous, but very few have recorded them. In some cases, the fluid vitreous remains behind the capsulozonular hyaloid barrier, while in others it is in free communication with the anterior chamber. There are means of recognizing both, although not in every case the latter, and the surgeon may be surprised to see fluid vitreous flow immediately after the section has been made. The profession in general is not aware of the possibilities of recognizing the condition before operation. I have had some gratifying and interesting experiences with such cases and have made some observations and speculation on the nature and cause of the condition and the method of handling the extraction of the cataract.

"When a dissolved state of the vitreous body exists, as it often does in old persons, the section of the cornea is perhaps no sooner made than the cataract, along with a greater or less quantity of the vitreous humor, bursts from the eye; or, the cataract sinking down behind the iris, a large quantity of vitreous humor alone bursts out. If the dissolution of the vitreous body be great, it will be evacuated wholly or in large quantity, and the eyeball may thus be destroyed, notwithstanding the utmost dexterity, delicacy, coolness, and circumspection on the part of the operator."[1]

Weeks[2] said that "in case of fluidity of the vitreous the tension of the eye may be reduced but it is not always so nor can we say that it is the rule. Such cases present complications when operative procedures necessitating the opening of the globe are undertaken."

Hundt[3] said that Peters had had a favorable outcome in a case of fluid vitreous from which he had removed a cataract. Peters assigned him to investigate the subject. I will quote Hundt at length. "The first information available on synchysis of the vitreous is the writings of the anatomists, Rosinius and Morgagni. The latter frequently found in post-mortem examinations that the vitreous had been completely replaced with a transparent fluid.

"Ophthalmologists such as Ammon, Himly and Wardrop added nothing new to this. An investigation of the subject was made by von Graefe who said that it was important to distinguish between a simple liquefaction of the vitreous and flocculent dissolution.

"Arlt, in his book (1856), divided fluid vitreous into five groups, the first in which the liquefaction followed mechanical injury to the vitreous, the second due to a drop in the pressure in the vessels of the interior of the eye. This he named *hydrops ex vacuo*. A third group of cases of fluid vitreous were observed associated with iritis, especially in the chronic cases. He noted that the vitreous liquefied more often in older people, whose lenses were either opaque or on the way to becoming so. He finally stressed especially the fact that eyes with high myopia and stretching of the posterior pole of the eye often had a fluid vitreous.

"In like manner do other older writers express themselves on fluid vitreous. Stellwag (1867) mentioned the occurrence of liquefaction following massive loss of vitreous. He divided fluid vitreous into (1) simple liquefaction without any solid particles and (2) a flocculent type in which the

* Presented at the 83rd annual meeting of the American Ophthalmological Society, Hot Springs, Virginia, June, 1947.

fluid contains degenerated products of inflammatory lesions, groups of cells, clots, pigment clumps, single or clumped cholesterol crystals, fat droplets, and so forth. Simple synchysis without preceding inflammatory processes is represented as a separate entity. He differentiated between liquefaction of the vitreous and separation of shrunken vitreous from the retina by serous exudate."

Hundt goes on to quote de Wecker, telling how he stressed "(1) chronic uveitis as a forerunner of fluid vitreous, (2) the liquefaction of the vitreous which follows direct injury to the vitreous by introduction of a foreign body and especially by *couching* of the lens, (3) senile degenerative changes accompanied by opacities in the vitreous, (4) poor nourishment of the tissues as related to diseased vitreous."

Fuchs was quoted as stating that the fluid which runs out in cataract surgery in such cases isn't always liquefied vitreous but may well be serous exudate which has accumulated between the retina and the vitreous. Fuchs also brings out the fact that operations in the latter cases may be followed by detachment of the retina and atrophy of the globe.

Von Michel is mentioned as having ascribed the cause of some cases to previous hemorrhage. Elschnig's study of fluid vitreous in myopes is mentioned with his conclusion that myopia can cause it but that the vitreous does not always liquefy in myopia. Behse studied 10 myopic eyes (up to 20D.) and found that in none of them was the vitreous normal. Seefelder found fluid vitreous in congenital hydrophthalmos. Naumoff stated that when the vitreous is fluid only in the center part one is suspicious that the change in consistency is recent. Hundt adds that the peripheral vitreous is normally firmer and would be the last to yield to liquefaction.

Hundt enumerates the significant sequels to fluid vitreous as follows: "(1) No effect on vision from fluid vitreous unless there are also floating particles which may be disturbing to the patient, (2) probably no effect on refractive index, (3) lens nutrition may suffer from chemical changes in the vitreous and a posterior cortical lens opacity may develop and this may or may not spread to the rest of the lens, (4) predisposes to dislocation of the lens, (5) fluid vitreous is of greatest significance when surgery is required, especially in cataract extraction."

Arlt is quoted as saying that you can expect a restoration of vision only if the loss of fluid vitreous is not more than one third of the total. Other authors, especially Czermak, are less conservative. Czermak attaches little significance to fluid vitreous. According to his experience the wound closes well and the globe soon resumes its normal volume. Also, according to Zehender, the eye from which fluid vitreous has been lost is less likely to have an inflammatory reaction after cataract extraction than eyes from which normal viscid vitreous has been lost.

Arlt is quoted as recommending that "In order to avoid loss of vitreous in patients with fluid vitreous they should be in bed when operated instead of sitting up. He added, however, that unfortunately it is seldom possible to establish in cataract patients a diagnosis of fluid vitreous. And, therefore, one will occasionally be surprised, at operation, by a total loss of the fluid vitreous which so radically alters the eye that restoration to its former shape seems doubtful, yet this is often very easy to achieve by filling the empty space with normal saline.

"The credit for the use of saline goes to Hermann Knapp who, in 1899, during a cataract extraction, noticing an unusually deep indentation of the cornea and subsequent infection, made the proposal that in such cases the anterior chamber be filled with physiologic saline in order to prevent infection while the anterior chamber was reforming. Since this method proved utterly harmless in another case of deeply indented

cornea after extraction, Knapp extended the recommendation for its use in cases where the globe collapsed completely after the corneal incision."

Hundt goes on: "It is noteworthy that this very worthwhile suggestion of Knapp's had very little attention; at least I found only two cases in the literature in which this method was used. Thus, Andrews reports that he succeeded in getting uneventful healing and good vision by injecting saline into an eye which had undergone severe loss of vitreous during the extraction of a traumatic cataract.

"Elschnig brought out this point again at a meeting in Heidelberg with a paper recommending in cases with vitreous opacities or hemorrhages treatment of partial withdrawal of the vitreous and replacement with physiologic saline.

"After Axenfeld had remembered that Knapp had recommended this procedure 10 years earlier, Elschnig reported that he, too, had had occasion to replace escaped vitreous with physiologic saline in a case of traumatic perforation of the globe with extensive loss of vitreous and retinal detachment. He reported that he obtained an excellent result."

Hundt goes on to report Peters' case: "It concerned a 65-year-old patient who, in addition to high myopia and a beginning cataract in one eye and a fully developed one in the other, also showed fluid vitreous. When the cataract incision was made, a large amount of entirely fluid vitreous flowed out, so that the sclera above showed a deep depression and the iris dropped back in a funnel-shaped position. The lens disappeared entirely so that the cornea's upper margin was dipping down perpendicularly. It was attempted to fill the globe with this saline. It was, however, impossible to overcome the deep groove in the sclera. The next day the shape of the globe was entirely normal and the anterior chamber was closed. Peters obtained a good result."

Elschnig[4] has reported that in 85 cases of highly myopic eyes intracapsular extraction was successful, 11 capsules ruptured but were extracted, that he was unable to grasp the capsule or that it had already ruptured in the anterior chamber in 18 cases. One eye was lost. "A comparison shows that in highly myopic eyes intracapsular extraction is much superior to extracapsular extraction in respect to all complications. In comparison with extraction in nonmyopic eyes, the danger of prolapse of the vitreous body is a little greater."

Meller[5] states that "Quite unavoidable is the prolapse of vitreous in the presence of complicated cataracts, when the zonule is ruptured or when the vitreous has lost its normal consistency."

Schoenberg[6] said that detachment of the vitreous is recognizable with the ophthalmoscope by the bright reflex in front of the retina. In some cases the vitreous shrinks and becomes detached, ordinarily at its posterior portion, while that part in contact with the ora serrata and ciliary body remains adherent.

Troncoso[7] said "Synchysis can be recognized more easily when the eye is rotated. There may be liquefaction of the vitreous with more or less complete destruction of the framework of fibers, and the appearance of adhering to the fibers or floating in the spaces between." Troncoso agrees with the classification of Bachstez of the lipid and nonlipid bodies moving in the vitreous as follows:

"(1) Bodies in the fluid vitreous: synchysis. (a) synchysis scintillans, (b) synchysis nivea or albescens; (2) Bodies in nonfluid vitreous: (a) asteroid hyalitis, (b) poorly defined flakes of unknown chemical nature."

Troncoso goes on: "*Synchysis scintillans.* This is a special degeneration of the vitreous which appears with the ophthalmoscope as a beautiful shower of sparkling gold particles rising with movement of the eye but sinking rapidly to the bottom. These glistening crystals consist of cholesterol (Clapp), and

appear sometimes in otherwise healthy eyes, especially in aged persons, without deterioration of the central vision. More frequently, however, they are signs of choroiditis occurring as the result of syphilis, arteriosclerosis, metabolic diseases, or trauma. The disease may appear in one or both eyes.

"*Synchysis niva or albescens.* The floating bodies appear as small, white, spherical opacities of a dull white color (Bachstez). They are probably leucine needles, tyrosine or phosphates.

"*Asteroid Opacities.* This is also a degenerative condition with deposits in the vitreous or numerous particles which, instead of being brilliant like the crystals, appear as small, spherical, isolated, white globules resembling snowballs (Holloway). Sometimes clusters of these balls may appear in the periphery. The white opacities are fixed, or move very slightly when the eyeball is rotated, as the vitreous is not liquefied. Benson gave this condition the name of *Asteroid hyalitis,* comparing the fundus picture to the sky studded with numerous stars. Verhoeff had the opportunity, in 1921, to examine chemically the snowball opacities and concluded that they consist chiefly of calcium soaps, calcium carbonate, and a certain amount of fatty or lipid substances. The source of the lipids seems to be, in part, the vitreous lipid. According to Krause, the lipid particles enter the vitreous from other tissues; it is probable that migratory leukocytes pass into the vitreous and die there, disintegrate and leave the lipids as inert particles floating in the vitreous."

Duke-Elder[8] said that "liquefaction of the vitreous body (Synchysis. Syn, together; Cheo, to pour) is the most common feature of degeneration, occurring in senile and myopic conditions and after contusions as well as in most degenerative and inflammatory states of the eye. It is due to a conversion of the colloid gel into a sol and is usually associated with the development of ophthalmoscopically visible opacities formed by the colloidal micellae which aggregate together in dustlike particles, strands or membranes. In a sense it is probably a dehydration rather than a hydration in so far as it represents the loss by the micellae of their water of absorption which becomes free intraocular fluid, leaving the protein residue shrunken and agglutinated. Such a breakdown may be due to purely physicochemical factors but may also be conditioned by enzymic digestion of the protein basis of the gel.

"Fluidity of the vitreous calls for no treatment; its clinical significance lies in the demonstration of degenerative changes in the eye, and in the possibility of serious complications occurring in intraocular operations, for in these eyes the zonule also is usually weak, and a dislocation of the lens and prolapse of the vitreous may easily occur."

The natural conclusion to be drawn from the last paragraph of Duke-Elder's statement is that there should be prophylaxis against luxation of a cataract when fluid vitreous is known to be present. It will be best judgment not to permit a cataract to become hypermature and risk luxation when it may be easily removed at a convenient time.

Arnold Knapp[9] said, "The question whether fluid vitreous is a contraindication is often raised. I am not convinced that this is a contraindication, if it is assumed that its presence can always be recognized beforehand."

Cataract in the Presence of Fluid Vitreous

The presence of fluid vitreous (synchysis) in a case of cataract may therefore indicate the need for a special handling of the eye and use of a special operative technique for extraction of the cataract. The preliminary examination of the eyes before cataract surgery may disclose whether or not the vitreous is fluid instead of being in its normal gel or viscid state. It may be discovered that it is well contained behind the capsulo-

zonular hyaloid barrier or on the other hand it may be in communication with the anterior chamber.

Viscid and semiviscid vitreous

If, directly after the section has been made and the aqueous evacuated, it is observed that the anterior chamber has reformed, it is an indication that a rupture of the hyaloid capsulozonular barrier had preëxisted or had developed during the section and the viscid or semiviscid vitreous had moved forward into the anterior chamber. Even the normal cornea with normal elasticity will collapse somewhat upon evacuation of aqueous. Therefore, if the chamber has deepened and the corneal shape has been restored, the only inference is that as given above. A loop or spoon extraction of the cataract is probably the only resort, as the viscid or semiviscid vitreous will interfere with the grasp of the interior lens capsule by forceps or other device. In some cases of semiviscid vitreous approaching the semifluid stage it may be possible to clear it from the capsule with a suitable applicator but not so in cases of viscid vitreous.

The escape of fluid vitreous

The effect of loss or evacuation of the normal amount of aqueous humor upon cataract section is well known. There is no rapid reformation of aqueous and no continued loss evident in the average case. Therefore, if a continued loss occurs, if fluid seeps away and continues to seep away, flowing out in a thin stream from part or all of the incision, the only inference is that it is fluid vitreous that is escaping. The fluid may be colorless or it may be slightly straw-tinged.

Intracapsular extraction indicated

A condition of hypotony will exist which will make ineffective any manipulation requiring pressure over the globe. Intracapsular rather than capsulotomy extraction will be indicated and necessitate the use of traction, rotation, and under certain conditions direct rupture of the zonule by separating or stripping it from its attachment to the capsule of the lens for the removal of the cataract with the least effort, trauma, and danger.

In the latter group of cases of fluid vitreous it must be inferred that a dehiscence or hole or tear in the hyaloid capsulozonular barrier was present before the section was made or that the zonule being fragile it developed because of the relatively minor trauma of the fixation or of the section or because of the change of hydrostatic pressure inside the eye.

The normal hyaloid capsulozonular barrier

Embryology. The lens plaque arises in the embryo as a result of contact between optic vesicle and surface ectoderm. There develop protoplasmic adhesions between the cells of the primordial lens and the optic vesicle, later the optic cup. As the lens develops, these adhesions are stretched out to form the zonular fibers. The latter in the adult extend between the ora serrata, accounting for its serrated form, and the equatorial portion of the lens capsule, running in and forming the ciliary valleys with secondary fibrillar attachments to the ciliary processes. Mann[10] said, "The primary vitreous is added from retinal ectoderm. The fibrils of the zonule, or tertiary vitreous, arise later from the ciliary epithelium." I have found by microdissection of living chick embryos that strong adhesions which may well be the anlage of the zonular fibers exist at all times after the contact of optic vesicle and lens ectoderm. Further observations should be made on fresh human embryos by microdissection. I believe that as revealing differences will be found between fresh and fixed specimens of the zonule at the different stages of development as are evident in the examination of fresh and fixed preparations of the adult zonule and its lamella. At the time of development of the tertiary vitreous the zonular lamella may be added to the zonular fibers.

Anatomy. In the fresh normal human eye, the zonule consists of (a) an orderly array of fibers and (b) a thin interfibrillar lamella which in clinical surgery gives the zonule the appearance of a membrane. It is not a true membrane like Descemet's but it may well act, when normal, to prevent the passage of particulate bodies from the vitreous to the posterior aqueous chamber. It may have some semipermeable quality, although this is very dubious. It is probably like the vitreous and is a condensation between the zonular fibers. The lamella is of the same index of refraction as the aqueous and is not visible in the living human eye when surrounded by the normal fluids of the eye, as, for example, in colobomas, either congenital, traumatic, or surgical. The zonular fibers are visible under these conditions. The lamella becomes visible when magnified and exposed to the air as, for example, in the surgery for removal of cataract. It disappears during the preparation of stained microscopic specimens, thus leading to the confusion of descriptions of fresh and fixed specimens. The normal hyaloid, zonule, and the lens in its capsule constitute in effect a barrier between the vitreous and the aqueous chambers. The hyaloid enclosing the vitreous anteriorly is separated from the posterior lens capsule by a thin film of aqueous, while in the periphery there is a greater depth of aqueous between the hyaloid and the zonule. The normal vitreous is fluid in the small central region of the canal of Cloquet. The greater portion is normally viscid.

Pathology. In pathologic conditions of the eye, there may be (a) absence or disinsertion of the fibers of the zonule, resulting in luxation or subluxation of the lens. This picture is familiar in congenital, degenerative, and traumatic conditions. In such cases there may be viscid or fluid vitreous in the anterior chamber. In congenital conditions, disinsertion is at the ora and ciliary body, whereas in traumatic, degenerative, and surgical conditions it is at the insertion into the capsule. There may be degeneration and perforation of the zonular lamella and hyaloid but intact zonular fibers. In all of these conditions, particulate bodies from the degenerated vitreous may enter the anterior chamber. When, in addition to the fact that the vitreous is fluid in a case of cataract, there are signs that the hyaloid capsulozonular barrier is missing, perforated, or ruptured, the surgeon is forewarned and may well be prepared for escape of the fluid vitreous immediately after the section has been made. I have observed such cases before and after surgery.

Fluid vitreous well contained behind an intact hyaloid capsulozonular barrier. There are relatively more cases of fluid vitreous well contained behind the hyaloid capsulozonular barrier than those in which a communication of the fluid vitreous exists with the anterior chamber through dehiscences in the barrier. The latter may appear to be a form of low-grade uveitis, in which there is no congestion but in which pigmented and nonpigmented particulate matter circulates in the aqueous and is deposited on the endothelium. I had in such cases considered this material evidence of degeneration rather than of inflammation, but I had not linked up with the possibility of this particulate material coming from the region posterior to the capsulozonular barrier. There is need for the recognition and differentiation of such cases from uveitis due to infection and inflammation. In the group in which the hyaloid capsulozonular barrier is intact, one may find signs of degeneration the same as in the lesser group but there may be no floating debris in the aqueous.

Preoperative examination of the eyes. Preparation for any cataract surgery should include details of examination with the ophthalmoscope, slitlamp, microscope, and tonometer. In cases in which the lens opacity is sufficiently dense to preclude the possibility of direct examination of the vitreous, its condition may be inferred, although not always correctly, by examination of the pa-

tient's fellow eye. One particular lead is to look for signs of degeneration of tissue in all cases of cataract before surgery.

THE SIGNS OF OCULAR DEGENERATION

The absence of congestion. In cases of degeneration alone there will be no congestion of the vessels unless there is consequent inflammation. It is well known that necrosis of degeneration may set up an aseptic inflammation. Congestion of the eye from any cause is an important sign of bad omen in relation to cataract surgery.

Tonometry. The intraocular pressure as indicated with the aid of a reliable tonometer may, if low, and particularly if there is hypotony, indicate that degeneration and fluidity of the vitreous may be expected. The prognosis for successful healing of a very low-pressure eye after cataract extraction when the tension with the Schiøtz tonometer is less than 8 mm. Hg is not good, and surgery, therefore, may well be avoided if possible in such cases. If the hypotony is of lesser degree, between 8 and 12 mm., the condition is less grave but there is a definite indication for particular care in the avoidance of trauma as in all ocular surgery. It has been said that in such eyes the extracapsular operation is indicated, but comparative results show that these eyes do not heal gracefully in the presence of retained cortex which is slow in absorption and productive of irritation, inflammation, and after-cataract; whereas, in my experience, intracapsular extraction has produced gratifying results.

Ophthalmoscopy. Sufficiently strong light should be used with the ophthalmoscope to pierce the lens opacity, if at all possible, and various dioptric values used to detect movement of the vitreous on rotation of the globe, its rate, and the presence of vitreous opacities. The rate and degree of disorderly movement of particulate bodies or opacities in the vitreous indicates the degree of fluidity of the vitreous. It may be possible to demonstrate increased fluidity of the anterior or central vitreous while the posterior or peripheral vitreous remains viscid. The binocular ophthalmoscope is particularly useful in examination of the vitreous.

Biomicroscopy. 1. The vitreous and zonule. Monocular and binocular loupes and the slit-lamp microscope are useful in the examination of the anterior vitreous. The appearance of the magnified normal vitreous with its beautiful transparent curtains and folds, with its undulatory controlled movement on rotation of the globe is a familiar picture. In cases of degeneration, the normal structure will be absent, and in its place there will be observed opacities of various pigmented and nonpigmented forms, dots, strings, conglomerate nebulae, or constellations which the patient may perceive as certain figures or as a jumble of moving clouds which disturb the clarity of his vision. These the ophthalmologist may see moving and swirling in disorganized fashion much more rapidly than any single opacity or group of opacities in the gel state of the normal vitreous, the rapidity of movement being an index of and in proportion to the fluidification of the vitreous. The vitreous may be found to have degenerated from the normal viscid gel to a semiviscid, semifluid, or completely fluid state. Particular examination for the presence of degenerated vitreous mixed with the aqueous or in the anterior chamber should be made in all cases of iridodonesis and inequality of depth of the anterior chamber as indicative of subluxation of the lens. In such cases it is known that there is a dehiscence or break in the zonule. It is a familiar phenomenon in congenital and traumatic luxation or subluxation of the lens to see viscid gel vitreous in the anterior chamber or at the side of the lens. In cases of senile deterioration or degeneration of structure, a minor trauma may cause a break in the zonule and evidence of fluid vitreous mixed with the aqueous may be present. The zonule is known to be fragile in such cases, and it is inferred to be fragile in cases of fluid vitreous because of coinci-

dent degeneration of structure of somewhat similiar origin and nature.

2. The deposits on the endothelium of the cornea. Differentiation should be made between the deposits of inflammation and those of degeneration in cases in which dehiscences in the hyaloid and zonule permit continuity between the aqueous and the fluid vitreous. The typical mutton-fat deposits of inflammatory uveitis have been well described elsewhere and are well known. They bear no resemblance to the deposits found in cases of degeneration. These are fewer in number, are not greasy, are not in clumps, and they do not assume the typical triangular pattern of those of inflammatory origin. They apparently have less cohesive and adhesive equality and appear to be resting on the endothelium, not adherent to it.

3. Particulate bodies in the aqueous. Opacities resulting from degeneration found floating in the convection currents of the aqueous are similiar to the deposits on the endothelium. The plasma clot of acute uveitis is never found in the cases of moderate degrees of degeneration, but one should not mistake the particulate floating bodies of inflammatory uveitis for those of degeneration.

4. The aqueous beam. The aqueous beam exhibits slightly more relucency than normal in case of fluid vitreous in the anterior chamber indicating the slightly greater protein content of the aqueous because of the admixture of the fluid vitreous. In cases, however, in which the beam is in excess of slightly more relucent than normal there should be a grave suspicion that the case is more complicated than can be explained by the presence of fluid vitreous mixed with the aqueous. A moderately to greatly increased protein content of aqueous may point to important complications of serious detachment of the vitreous, uveitis, serous exudate, and detachment of the retina. The sign of increased relucency of the aqueous combined with hypotony with faulty light projection and color perception is of serious omen in establishing the prognosis of complicated cataract.

The form of the cataract. The form of complicated cataract, not always however associated with fluid vitreous, may be that of (a) the postcortical or saucer-shaped variety. It may have the iridescence described by Vogt and this may be a sign of a particular degeneration but the use of the term "complicated cataract" in this connection does not necessarily mean that useful vision cannot be obtained after removal of the cataract. The complication may be only in the lens, zonule, or vitreous and not particularly in the uvea, retina, or nerve. (b) The anterior and posterior subcapsular form, which may be regarded as a variety of the posterior-cortical. In some cases the number of lens globules and the pattern of the anterior opacity may be as great as that of the posterior. Cortical and nuclear haze develop sooner, the onset of intumescence is earlier, and the progress of development of the complete opalescent or dull gray white opacity of the lens is more rapid in the second form. Not all cataracts which develop rapid intumescence are complicated. During surgery the taut capsule of a swollen lens may be found to be rubbery, thick, and tough, or it may be very thin and fragile. The zonule may be resistant or fragile. The well-known forms of presenile and senile cataract, nuclear, corticonuclear, and cortical, immature, mature, and hypermature may all be associated with fluid vitreous and fragile zonules.

Other signs of degeneration. Other signs of coincident ocular degeneration should be looked for and evaluated as, for example, fragility of the conjunctiva, atrophy of the sclera, arcus senilis, dystrophy of the endothelium of the cornea, atrophy of the iris, and exfoliation of the most superficial lamella of the anterior lens capsule. An inference that may well be drawn in the presence of any sign of degeneration is that other structures of the eye may be degenerated. There may be in the presence of cataract, and any or all of the signs enumerated, sclerosis of the cells of the iridocorneal angle, fragility of the zonule, and fluid vitreous.

The recognition of fluid vitreous in communication with the aqueous before operation. The determination of fluid vitreous by ophthalmoscopy and biomicroscopy when the lens is sufficiently clear is relatively easy. It is also possible to recognize the condition of communication of fluid vitreous with the anterior chamber without evident subluxation of the lens and to differentiate it from uveitis due to inflammation. It must again be asserted that the process of degeneration may in itself produce inflammation, although this will usually be different than that engendered by infection, and it must be repeated that signs of severe or extensive degeneration with fluid vitreous, particularly with hypotony and increased aqueous flare, even though the light perception and projection are fairly accurate, must give a poor prognosis.

The Cause of Cataract, Fragility of Zonule, and Fluid Vitreous

The coincidence of cataract, fragility of zonule, and fluid vitreous connotes deterioration of the substance of the crystalline lens, zonule, and of the vitreous humor, and may be regarded as a dystrophy or degeneration dependent on faulty nutrition, abiotrophy and senescence of ocular tissues which may be local or part of a general condition, hemorrhage into the vitreous, myopia, trauma, inflammation, and detachment of the retina.

1. Faulty nutrition. The lens, zonule, and vitreous may suffer from faulty nutrition because of degeneration of ciliary body and the production of poor-quality aqueous. The proper utilization of vitamins, proteins, fats, carbohydrates, and minerals is important in the maintenance of nutrition, health, and transparency of the lens, zonule, and vitreous. Faulty blood supply to the eye, particularly to the ciliary body, may produce faulty nutrition of the lens, zonule, and vitreous and consequent cataract, fragility of zonule, and fluidification of the vitreous.

2. Abiotrophy and senescence. Abiotrophy and local senescence of tissue may be a factor in the development of cataract, fragility of zonule, and fluid vitreous. The span of life and function of these tissues of ectodermal origin may be less than that of the rest of the eye or body and thus be the reason for their earlier deterioration. Other examples of abiotrophy in the eye, such as the degeneration of the pigmented and nonpigmented cells of the posterior surface of the iris and of the ciliary body in certain cases of glaucoma, of the pigment epithelium of the retina and of the choroidal blood vessels in retinitis pigmentosa, may be cited. The eye and its tissues share in the process of general senescence. A large percentage of all elderly persons have some signs of cataract and degeneration of lens capsule and zonule, but relatively few develop fluid vitreous.

3. Hemorrhage. Hemorrhage into the vitreous may be a cause or an accompaniment of the degeneration of the vitreous.

4. High myopia. Progressive myopia leading to the higher degrees of myopia, although it may be caused by a number of factors, may in some instances be regarded as a dystrophy or degeneration in which the lens, zonule, and vitreous suffer. From the mechanical viewpoint, the self-limited vitreous gel sufficient to fill a normal eye is incapable of expanding to the size of the highly myopic eye. The balance of the space is filled with fluid. The remaining gel may tend to liquefy so that the whole may eventually become fluid. Fluid vitreous may well be expected in all cases of high myopia, although as shown in Elschnig's and in my series of cases the vitreous may be retained behind an intact hyaloid and be no contraindication to intracapsular extraction.

5. Trauma. Contusion trauma sufficient to rupture the normal zonule from its attachment to the lens capsule must be relatively great. It is remarkable that the eye as a whole can stand such injury. If the lens is luxated into the vitreous by trauma it may act either with its capsule ruptured or intact as a foreign body and, in addition to its potentialties of exciting aseptic inflammation, may cause degeneration of tissue and fluidification of the vitreous. Even without

gross rupture of the globe, contusion trauma may produce degeneration of the ciliary body, hypotony, cataract, and fluid vitreous.

6. Inflammation—Uveitis due to infection. Any case of uveitis, particularly of cyclitis and choroiditis, may develop cataract and fluid vitreous as a complication or consequence of the inflammation. All cases of cataract should be examined with magnification to determine whether or not there are signs of causative or complicating uveitis. Excluding the active congestive states of acute uveitis, one should look for the insidious quiet cases which may show (1) a few typical mutton-fat deposits on the endothelium of the cornea, (2) particulate bodies either floating in the aqueous or fixed in a plasma clot in the anterior chamber, (3) increased relucency of the aqueous, (4) ciliary congestion, (5) posterior-cortical form of cataract, (6) opacities in the vitreous, and (7) signs of coincident or consequent degeneration.

If degeneration of the lens, vitreous, and uvea develops rapidly or extensively, there may be engendered an inflammatory reaction because of the nature of the toxic necrotic material which must be absorbed and in the process proves irritating to the uvea. Such a reaction may be entirely similar to that produced by an infection to which the uveal tissues may have become sensitized.

7. Detachment of the retina. When detachment of the retina first develops, the vitreous may be quite normal and viscid. If the detachment exists for a length of time or becomes extensive, degeneration and liquefaction of the vitreous will ensue. Hence, it is of particular importance in each case of cataract and fluid vitreous to exclude detachment of the retina by objective examination and by subjective tests before surgery. On the other hand, if detachment of the retina does not exist at the time of surgery it has been my experience in this series, except in one case, that it has not developed after the extraction of the cataract even when the fluid vitreous has escaped and later been replaced by normal saline or by natural restoration of intraocular fluid.

Indications and prognosis in cases of cataract and fluid vitreous. Degeneration of the normal gel viscid vitreous at the time of cataract surgery may have caused it to become semiviscid, semifluid, or completely fluid. Degeneration of the lens, zonule, and vitreous does not necessarily indicate an accompanying degeneration of the retina, nerve, and uvea. Eyes in which the latter is not present and from which the cataract has been removed may heal well after surgery and maintain good function, central form and color and peripheral field vision for years afterward. They seem to do so well after the indicated nontraumatic intracapsular cataract extraction that it may be judged that the cataract had been liberating toxic bodies, freedom from which has a salutary influence.

I believe that extracapsular extraction is contraindicated in such cases because it has been common experience that cortical remnants do not absorb gracefully when mixed with vitreous, normal or in any stage of degeneration. The cataract may be removed fairly easily in the capsule because of the fragility of the zonule. Minor subluxations do not alter the prognosis. Complete luxation into the anterior chamber or into the fluid vitreous complicates the condition. When fluid vitreous is recognized, the cataract should be removed before hypermaturity makes probable the development of complete luxation. One should not be deceived in the interpretation of signs of degeneration or inflammation and give a good prognosis when other serious complications are present.

The disaster of the loss of viscid vitreous. Nothing that is said in this paper should be taken to minify the bad effects of the loss of normal viscid vitreous in cataract surgery. Eyes in which normal viscid vitreous is extruded may be lost through infection, uveitis, through faulty healing, or by detachment of the retina. More such eyes are lost when the

hyaloid ruptures inside the eye than when the hyaloid remains intact but incarcerated in the healed incision. Disaster usually attends the rupture of the hyaloid and extrusion of viscid gel vitreous into the anterior chamber or actual loss and incarceration of the fibrillae. The methods of prevention or of successfully dealing with this complication when it is imminent or when it has actually happened have not been developed. This is one of the real problems of the future in cataract surgery.

The removal of cataract in the presence of fluid vitreous

The recognition of fluid vitreous before operation, whether apparently well contained behind the hyaloid capsulozonular barrier or in communication with the anterior chamber, need not deter the surgeon from removing the cataract whether it be completely luxated, partially subluxated, or with the lens in proper position. I have several private communications from surgeons who abandoned the operation after the section had been completed and fluid vitreous found. It is technically possible to remove such lenses best in their capsules without undue trauma and to have good visual results, provided the functional tests of the eyes are good before the operation and there are no other insurmountable local or general complications.

1. The removal of cataract luxated into the anterior chamber in the presence of fluid vitreous. If the cataract is found in the anterior chamber, preplaced sutures and a small limbus incision enlarged by scissors, avoiding injury to the lens capsule, may allow the lens to escape. If not, a loop or forceps may be used to remove it. If the cataract has been in the anterior chamber for some time and adhesions have formed with development of increased intraocular pressure, the problem is greater and more unsatisfactory in its solution.

2. The removal of cataract completely luxated into fluid vitreous. In the presence of fluid vitreous a completely luxated cataract may be found floating about with the motion of the eye, settling down when the eye is quiet, and tending to become adherent to the retina or ciliary body. A cataract completely luxated into the vitreous may or may not be readily detected and localized. Ophthalmoscopy and direct observation with the aid of the Hildreth or Hague ultraviolet lamps, which with a filter utilize the natural fluorescence of the lens tissue for its visual demonstration, may help. If the cataract is adherent to the ciliary body, it may not be visible.

Luxated lenses are said to float up and forward directly after the incision has been made, thus obviating any necessity of fishing for them, but this behavior only applies to cases in which viscid or gel vitreous is back of the subluxated lens. As soon as the section is made, such viscid vitreous itself moves forward, bringing the lens with it. If the lens is freely movable in fluid vitreous, the effect of having the patient lie prone on the abdomen and with dilatation of the pupil, trying to coax the cataract into the anterior chamber, imprison it there by the use of miotics contracting the pupil, from which it may be more easily removed. By experience, however, it is known that it is difficult to keep the lens in the anterior chamber during the steps preceding the extraction.

If the luxated cataract cannot be gotten into the anterior chamber, I would recommend that the surgeon should not fish around blindly with a spoon or loop for the cataract or lift it off the retina, on which it may have settled. This may be productive of severe reaction and probable loss of the eye. A floating lens may be carefully picked up on a loop and removed.

There are two very ingenious methods which have been described in which success has been achieved in the removal of luxated cataracts from fluid vitreous: (1) the technique reported by Verhoeff,[11] who described how he made the incision, lifted the corneal flap, directed a stream of saline into the fluid

vitreous, causing the loose lens to float up from the retina into a position from which it could be removed and (2) the method of Bracken,[12] who inserted corneoscleral sutures, made the incision, then had the table elevated, the specially robed and draped patient turned over from the supine to the prone position, so that the lens dropped into the anterior chamber from which it was easily removed with a loop. It need not be assumed that all of the fluid vitreous would run out under such conditions. Saline may be used to replace some of the fluid vitreous which escapes after the patient has been returned to the supine position. Then the toilet of the operation may be completed.

3. The removal of subluxated cataract in the presence of fluid vitreous. If it is known beforehand that the lens is partially subluxated and that fluid vitreous is in communication with the anterior chamber, then sutures may be placed before or after the section has been made, a loop passed through the opening in the zonule behind the lens to support it, bringing it forward and removing it if the zonule is very fragile. If the remainder of the zonule displays any resistance, I believe it best not to use traction alone with the loop to remove the cataract, but, having lifted it up into position, to grasp the anterior capsule with forceps and then slip the loop around the zonule to rupture it directly by separating or stripping it from the capsule, thus freeing the lens for nontraumatic delivery.

4. The removal of cataract in the presence of fluid vitreous when the zonule is intact and the lens is in normal position. Preparation for surgery. The usual preoperative preparations of sedatives, cultures, atraumatic cleansing of the field, asepsis, and so forth, are all indicated. Local anesthesia is employed by instillation, and by injection, avoiding retrobulbar injection except in patients who have good blood vessels. Intravenous anesthesia in the hands of some, and with selected patients, may have very desirable features, but it is not without complications and dangers. Complete akinesia is desirable and if the patient is not confident and relaxed, various delays or changes with the addition of more sedatives may be resorted to until he is quiet.

Incision. A speculum, such as the Lancaster smooth, solid blade properly supported by an assistant, is preferred to lid sutures or metal retractors. Lateral canthotomy is done if there is any lid pressure upon the globe. Fixation is taken lightly on the medial rectus tendon. A narrow point of fixation is preferred to a broad one. The conjunctiva may be severed from the upper limbus by peritomy so that there will be no flap to interfere with the manipulations of extraction or the firm closure of the corneoscleral incision. A beveled corneoscleral section with a narrow conjunctival flap is made with the Graefe knife from about one quarter to one third of the circumference of the limbus. It is enlarged with the scissors on each side to two fifths, usually to one half, of the limbus circumference according to the size of the cataract, care being taken not to buckle the tissues or to cause pressure during any maneuver.

Sutures. If preplaced sutures are indicated, I prefer the Suarez de Mendoza[13] or the McLean[14] type. I have found by experience that corneoscleral sutures may be efficiently placed after the section, except in cases of presentation, prolapse, or loss of viscid vitreous. As previously described, three accurately placed radial appositional atraumatic 5-0 black silk sutures are inserted with a small, sharp-cutting 3/8 curve needle, using a standard Kalt needle holder and special forceps designed for the purpose. The central of the three sutures is at first passed through only the outer half of the corneal edge and is used for traction and direct exposure of the iris and lens. It is completed and passed through the outer half of the scleral edge after the extraction of the lens. The ease of insertion of such sutures with proper instruments, the airtight or watertight quality of the anterior chamber

produced by the proper apposition of incision edges after such suturing, the retention of saline or air which may be injected into the anterior chamber after the extraction have made the use of radial appositional sutures valuable in the presence of fluid vitreous. The loose conjunctiva is sutured separately after the corneoscleral sutures have been tied.

Intraocular pressure after corneoscleral section. Immediately after the corneoscleral section has been made in the average eye for the removal of cataract, the intraocular pressure drops to that of the surrounding atmosphere, unless there is present increased intravitreous, uveal, or retrobulbar pressure. The eye retains its contour, particularly if the sclera and cornea have their normal tissue resiliency, elasticity, and structure. The surgeon may feel assured if he notes a little dimpling or falling in of the cornea, denoting the fact that the cataract, vitreous, and uvea are remaining in their normal positions and that the eye will behave well under the manipulations of cataract extraction.

When, however, after the corneoscleral section, the aqueous has escaped and fluid vitreous seeps out and continues to flow away in a thin stream, and the globe appears to collapse somewhat, the lens and iris falling to a deep posterior position, then the surgeon may well show concern because of the evident hypotony and difficulty of extraction of the cataract, particularly in a case in which the condition was not diagnosed before operation. Such a state is not the dreaded complication of the lens becoming completely luxated and falling deep or out of sight into the vitreous, but it may be possible for this to occur through injudicious handling of the case, as, for example, by an attempted loop extraction, passing the instrument through a portion of the zonule which is intact. Certainly pressure upon the exterior of the globe for intra- or extracapsular extraction in this predicament is inadvisable, inefficient, and contraindicated for removal of the cataract because of the evident hypotony, the impossibility of rupturing the zonule by pressure, or of expressing the lens nucleus if the capsule has been opened, and the evident escape of more fluid vitreous with each pressure manipulation.

The handling of the iris. The criteria used previously for the handling of the iris apply to cases of cataract with fluid vitreous. If the pupil will dilate to but 4 mm., a complete iridectomy is necessary. If it will dilate to 5 mm., a small cataract may be removed through the round pupil. If to 6 mm., the removal of any size cataract through the round pupil is feasible. Peripheral iridotomies, two in number and placed between the central and lateral sutures, are desirable.

The experience of distortion of the pupil, drawing up of the iris and ciliary body by a mass of viscid vitreous or by strands of semiviscid vitreous does not apply to cases of fluid vitreous. The pupil and iris may be as free and perfect as after an uncomplicated case in which the hyaloid remained intact and in normal position.

The removal of cataract in the presence of fluid vitreous. A redescription of the maneuvers used in my system of intracapsular cataract surgery[15] seems desirable in this paper. If the fluid vitreous is well contained behind an intact hyaloid, all of the procedures may well be applied although one should be cautious of the use of any pressure on the globe. The condition of the eye in which fluid vitreous has seeped away immediately after the section makes it evident that pressure should not be used even for a preliminary test of conditions. The tension is very low and the resistance found in the average case with intact vitreous and hyaloid is not present. The iris and the lens or cataract fall well back into the eye. The lifting or elevation of the corneal flap permits the surgeon to assay the conditions present. My experience has shown that I may reach in with a suitable intracapsular forceps, place it ever so lightly on the capsule, close the forceps to the stop which prevents too firm a closing, get a proper grasp of a sufficient

portion of the capsule, preferably just anterior to the superior equator of the lens, and lift the lens to the level of the open incision where I can manipulate it. I need not fear loss of viscid vitreous for there may be none or, if there is any, it may be well back in the posterior portion of the eye. I can calmly make traction to one side, putting the zonule under tension, and, with a blunt instrument such as the loop or the elbow of the lens expressor hook, separate or strip off a small area of zonule to start the process of direct rupture of the zonule. Further rotation may tear the hole in the zonule larger, or I may use the blunt instrument more to separate the zonule farther. When more than 120 degrees of zonule have been removed, the balance may be torn circumferentially by rotation first to one side, then to the other, and the lens wheeled out to one side or the other. If need be, the grasp of the forceps may be released and reapplied or a second pair of forceps may be applied to provide further rotation.

If subluxation of the lens is present before the incision is made or if it develops because of manipulations in such an eye in which the vitreous is fluid and the zonule fragile, then it may not be safe or feasible to place the forceps on the lens capsule. I have in such cases placed a wire loop behind the lens, introducing it advisedly through the area in which the zonule is already missing or ruptured rather than going through the typical textbook manipulations of the introduction of the loop from above, endangering, in a case in which the upper portion of the zonule is the only intact part, complete luxation and a more difficult task of removal of the lens. When once the loop has been placed behind the lens, it may easily be removed by direct traction with the loop if the zonule is fragile, but if not, the loop should be used first to bring the lens forward and support it, while the corneal flap is elevated and forceps applied to the lens capsule. Then, with the forceps holding the lens, the loop may be used for direct rupture of the zonule by separating or stripping it from the capsule to provide easy delivery.

I would not advise the use of a barbed vectis for direct traction under any conditions. The experience of some in using a flat or shallow concave spoon as a sliding plane, holding it still while pressure through the cornea causes the lens to slide up and out, has met with success except when the zonule is resistant. The use of the suction cup or erisophake does not seem advisable if there would result aspiration of the intervening fluid vitreous before the lens capsule is engaged.

Direct rupture of the zonule by separating or stripping it from the capsule has been previously reported as a feasible, desirable, efficient, and conservative procedure in cases in which the zonule has proved to be more elastic, resilient, and resistant than that found in the average cataract case, and in which an average or safe amount of pressure, traction, and rotation has failed to deliver the cataract. The further application of these principles and maneuvers to cases of cataract in the presence of fluid vitreous was a natural one. It was definitely indicated because of the inadvisability of using pressure, the futility, faulty judgment, inefficiency, and even hazard of pressure or traction alone if they be applied in such a case. Experience with its application in these complicated cases has been gratifying.

Toilet of the incision and completion of the operation. If the iris is not caught between the edges of the incision, the iris repositor need not be used. The lateral sutures are tied with three square reversed loops. Then the central suture is completed and tied.

Transplantation or replacement of vitreous. It has not seemed nor been found necessary to replace the fluid vitreous, which has escaped, by transplantation of vitreous or replacement with fluid other than normal saline, which was used in relatively few of the cases.

A suture is placed between the skin of the

upper and lower eyelids to splint them and to be sure that the eye is kept closed. Physostigmine sulfate (½ to 1 percent) in aqueous solution is instilled. A single or double eye dressing and mask is applied, according to the behavior and coöperation of the patient. Atropine-sulfate solution is used at the first and subsequent dressings as indicated.

The vitreous after intracapsular cataract extraction. After removal of a cataract in the capsule in the otherwise normal case with gel vitreous, the latter may be seen delimited from the aqueous by the hyaloid. It may be on a plane posterior to the iris, protruding slightly through the pupil or prolapsed into the anterior chamber.

The prolapse and loss or incarceration of normal gel vitreous will usually result in an updrawn pupil, even more so when an iridectomy has not been performed, and the incarceration of the hyaloid and of the vitreous fibrillae in the healed incision. The complications attendant upon such an event have been described.

In cases of semiviscid vitreous, there may be found isolated strings of vitreous substance, one or more of which may become incarcerated. After removal of cataract from cases of fluid vitreous, there may be no gel vitreous to be seen, only fluid similar in all respects to that of the anterior chamber.

In addition to the cases in which there are manifest evidences of dehiscences in the hyaloid and zonule before the section is made, there are those of known fluid vitreous often in high myopia in which during and after the procedure of extraction the hyaloid has not been ruptured and has remained intact, still containing the fluid vitreous.

Opinions concerning the handling of such cases vary much. Some say that preliminary iridectomy and capsulotomy and removal of the lens nucleus and cortex by expression are indicated. One illustrative case of recurrence of secondary membranes (Case 4, L. B. in Series 1) after extracapsular extraction is given to illustrate one of the complications. Discission of such membranes as found necessary in many cases of extracapsular extraction produces the communication between the fluid vitreous and the anterior chamber which it was the purpose of the procedure to avoid. My experience has shown that such eyes react well to intracapsular extraction with emphasis on traction and rotation for the delivery rather than pressure in the eye that usually has low tension. If the cataract does not come away easily with traction and rotation then direct rupture by separation or stripping of the exposed zonule has served a very useful purpose.

Case reports

Series 1

Case 1. C. E. A., a white woman, aged 68 years, was an artist. She had been myopic since the age of nine years. Vision was: O.D., with a −17D. sph. = 1/6; O.S., with a −21D. sph. = 1/10. The cataracts were corticonuclear. The vitreous was fluid with opacities. The fundi showed large areas of myopic degeneration and posterior staphyloma, particularly in the left eye. Intraocular pressure measured: O.U., 16 mm. Hg (Schiøtz). On January 10, 1944, an intracapsular extraction with iridectomy was performed on the left eye without any presentation of vitreous. On April 27, 1944, vision was: O.S., +4.25D. sph. ⊃ +1.50D. cyl. ax. 155° = 4/6. The same operation was performed on the right eye on November 14, 1944. On January 23, 1945, vision was: O.D., +3.75D. sph. ⊃ +1.25D. cyl. ax. 25° = 3/6; O.S., +4D. sph. ⊃ +1.25D. cyl. ax. 170° = 4/6. One year later, a macular, retinal hemorrhage developed in the right eye which reduced the central vision to 2/6.

Case 2. C. H., a white woman, aged 70 years, was a nurse. She had been myopic in her right eye and worn glasses since the age of 34 years. On October 16, 1944, vision was: O.D., −6D. sph. = 4/6; O.S., −4D. sph. = 3/100. A partial cataract was present in the right eye. The fundus of the left eye could not be visualized and there was a partially complete cataract. An intracapsular extraction through a round pupil was performed on the left eye. On December 28, 1944, vision was: O.S., +12.5D. sph. ⊃ +3D. cyl. ax. 30° = 4/6. There was further development of the lens opacity in the right eye, and the same operation was performed on this eye on March 12, 1945. On April 12, 1945, vision was: O.D., +8.5D. sph. ⊃ +2D. cyl. ax. = 3/6. On May 21, 1945, vision was: O.D., +7.5D. sph. ⊃ +2D. cyl. ax. 140° = 3/6; O.S., +12D. sph. ⊃ +2.50D. cyl. ax. 32° = 4/6.

Case 3. C. H., an actor, aged 66 years, had, on September 28, 1942, lost the sight of his left eye through inflammation, detached retina, and glau-

TABLE 1

SUMMARY OF REPORT OF CASES OF FLUID VITREOUS WITHOUT ESCAPE AT TIME OF SURGERY FOR REMOVAL OF CATARACT*

Case	Name	Age	Tension	Refraction Before Operation	Eye	Refraction After Operation	Vision	Pupil
1.	C. E. A.	68	16	−17.00	O.D.	+3.75 +1.25 ax. 25	2/6	Coloboma
	C. E. A.	68	16	−21.00	O.S.	+4.25 +1.50 ax. 155	4/6	Coloboma
2.	C. H.	70	14	−6.00	O.D.	+7.50 +2.00 ax. 140	3/6	Round
	C. H.	70	14	−4.00	O.S.	+12.00 +2.50 ax. 32	4/6	Round
3.	C. H.	66	18	−4.50 −2.50 ax. 20	O.D.	+8.00 +1.50 ax. 100	6/6	Anterior synechia superior nasal
4.	L. B.	70	12	−16.00 (Capsulotomy O.U. in 10 yrs.)	O.D.	−1.50 +3.50 ax. 20	3/6	Coloboma
	L. B.	70	12	−21.00 (3 discissions O.U. in 10 yrs.)	O.S.	−3.50 +4.50 ax. 20	3/6	Coloboma
5.	A. L. B.	57	16	Unsatisfactory	O.D.	+10.00	5/6	Coloboma
6.	G. B.	64	—	−10.00	O.D.	+2.50 +2.75 ax. 175	4/6	Round
	G. B.	64	—	−10.00	O.S.	+4.00 +2.50 ax. 150	4/6	Round
7.	G. L. H.	45	12	−14.00 −5.00 ax. 165	O.D.	−1.00 ax. 135	2/6	Round
	G. L. H.	45	12	−13.00 −4.00 ax. 165	O.S.	+1.50 +2.50 ax. 180	4/6	Round
8.	C. F.	60	7	−25.00 −.50 ax. 180	O.D.	−2.25 +3.25° ax. 160	3/6	Round
	C. F.	60	7	−19.00 −1.00 ax. 105	O.S.	+.50 −4.00° ax. 55	1/6	Round
9.	G. B.	71	10	−18.00	O.D.	−1.00 −2.00 ax. 95	1/10	Round
	G. B.	71	10	−20.00	O.S.	−1.50 +3.50 ax. 25	1/10	Round
10.	B. C.	53	18	−13.00 −7.00 ax. 175	O.D.	+2.25 +1.25 ax. 110	4/6	Round
	B. C.	53	18	−8.50 −4.50 ax. 165	O.S.	+2.00 ±4.50 ax. 155	2/6	Round
11.	M. F.	66	14	−19.00 −1.00 ax. 180	O.D.	+3.50 +3.25 ax. 15	3/6	Round
	M. F.	66	14	−20.00 −1.50 ax. 165	O.S.	—	—	—
12.	A. F.	68	8	−14.00	O.S.	−4.00	2/20	Round

* Twelve cases reported, 20 eyes operated upon. Ages 45 to 70 years. Tension from 7 to 18 mm. Hg Schiøtz. Nearly all myopic Postoperative acceptance in proportion to previous axial and lenticular myopia. Vision obtained from 1/10 to 7/6. Three patients had 1/10, 1 had 1/6, 2 had 2/6, 3 had 3/6, 7 had 4/6, 1 had 5/6, and 1 had 6/6. One developed anterior synechia and glaucoma and glaucoma controlled by miotics. Most of the cases had areas of degeneration of choroid and retina. In no instance did detachment of the retina develop.

coma. There was no light perception. Vision in the right eye was: −4.5D. sph. ⌒ −2.5D. cyl. ax. 20° = 1/6. Tension of the right eye measured 18 mm. Hg (Schiøtz). On November 10, 1942, an intracapsular extraction with peripheral iridotomy was performed on the right eye without any presentation of vitreous. During convalescence, due to the strain of vomiting, peripheral anterior synechia developed superior nasally over one sixth of the angle circumference. On December 11, 1942, vision was: O.D., +10D. sph. ⌒ +0.5D. cyl. ax. 95° = 4/6. On December 12, 1942, there was a transient attack of glaucoma with tension measuring 50 mm. Hg (Schiøtz). The attack subsided under treatment with pilocarpine and mecholyl. On December 19, 1942, vision was: O.D., +8D. sph. ⌒ +1.5D. cyl. ax. 100° = 6/6. Tension was normal. Vision was the same on November 20, 1946.

Case 4. L. B., a white woman, aged 70 years, was an artist. Vision was: O.D., −16D. sph. = 2/100; O.S., −21D. sph. = 1/8. Intraocular pressure was: O.U., 12 mm. Hg (Schiøtz). On May 22, 1935, a capsulotomy extraction with iridectomy was performed on the right eye. On November 13, 1935, vision was O.D., +1.0D. sph. ⌒ +4D. cyl. ax. 20° = 1/10. Discission of after-cataract of the right eye was done on November 26, 1935. A capsulotomy extraction with iridectomy was performed on the left eye on December 2, 1935. On March 13, 1936, vision was: O.D., −1.5D. sph. ⌒ +3.5D. cyl. ax. 20° = 3/6. On January 2, 1938, vision was: O.D., with the same acceptance, 1/6; O.S., with the same acceptance, 5/100. Discission was performed on both eyes and, on June 2, 1944, was repeated because of reformation of after-cataract. With the same acceptance, vision in each eye was 4/6. Semifluid vitreous with opacities could be seen through the discission openings.

Case 5. A. L. B., a white man, aged 57 years, a broker, was first seen on October 19, 1944. He had had uveitis in both eyes for years. This condition had been treated with old tuberculin by the oculist who referred him for surgery. Vision in the right eye was hand movements with good light projection and perception of colored light. Vision in the left eye was 1/6 with a +1.5D. sph. ⌒ −3.5D. cyl. ax. 155°. There was a corticonuclear cataract in the right eye, and a partial cataract in the left eye. Intraocular pressure was: R.E., 20 mm. Hg (Schiøtz); L.E., 16 mm. Hg. An intracapsular extraction with peripheral iridectomy and no escape of vitreous was performed on November 20, 1944. On December 21, 1945, vision in the right eye was 1/6 with a +10D. sph. and there were many large opacities in the fluid vitreous. On March 15, 1945, vision in the right eye was 3/6, with a +10.5D. sph. ⌒ +0.75D. cyl. ax. 135°. On June 27, 1945, the vitreous of the right eye was quite clear, and vision with the same acceptance was 3/6+. The vision of the left eye has become quite poor through further development of lens opacities. Intraocular pressure was: O.D., 16 mm. Hg (Schiøtz); O.S., 18 mm. Hg. Late in 1946, vision in the right eye had improved to 5/6, and the same operative procedure was used for the left eye with equally promising results.

Case 6. G. B., a white woman, aged 64 years, was a housewife. When she was first seen on June

12, 1937, she stated that she had always been myopic. Vision was: O.D., −10D. sph. = 1/6; O.S., −10D. sph. = 3/6. Interior fluid vitreous was present, and there was a myopic fundus. An intracapsular extraction with peripheral iridotomy was performed on the right eye on September 14, 1937. On October 5, 1937, vision was: O.D., +3D. sph. ⊃ +2.5D. cyl. ax. 150° = 2/6; and on October 29, 1937, vision in this same eye was 4/6− with a +2.75D. sph. ⊃ +2.75D. cyl. ax. 175°. Vision in the left eye, with acceptance, was 1/6. On November 8, 1937, the same operation was performed on the left eye. On December 16, 1937, vision was: O.D., +2.5D. sph. ⊃ +2.75D. cyl. ax. 175° = 4/6; O.S., +4D. sph. ⊃ +2.5D. cyl. ax. 150° = 4/6.

Case 7. G. L. H., a white woman, aged 45 years, was a secretary who had always been myopic. When first seen on February 3, 1947, there were old, interstitial corneal opacities; cause not determined. There were partial lens opacities in each eye. Vision was: O.D., −14D. sph. ⊃ −5D. cyl. ax. 165° = 1/6; O.S., −13D. sph. ⊃ −4D. cyl. ax. 165° = 2/6. Semifluid vitreous was present. The fundi could not be visualized well, but no areas of degeneration were seen. The fundi were seen with a −24D. sph. Intraocular pressure was: O.U., 12 mm. Hg (Schiøtz). An intracapsular extraction with peripheral iridotomy was performed on the left eye on March 8, 1937. The same operation was performed on the right eye on June 14, 1937. On December 1, 1937, vision was: O.D., −1.0D. cyl. ax. 135° = 1/6+; O.S., −1.5D. cyl. ax. 180° = 1/6. By February 5, 1938, vision was much better. The patient can now see to read and work. On June 13, 1940, vision was: O.D., −1.0D. cyl. ax. 135° = 2/6+; O.S., +1.5D. sph. ⊃ +2.5D. cyl. ax. 180° = 4/6.

Case 8. C. F., a white woman, aged 60 years, a housewife, was first seen on March 6, 1935. She had always been myopic. At this time vision was: O.D., −25D. sph. ⊃ −0.5D. cyl. ax. 180° = 1/6; O.S., −19D. sph. ⊃ −1.0D. cyl. ax. 105° = 1/6. Fluid vitreous with large opacities was present in both eyes. There were partial nuclear cataracts, marked chorioretinopathy, and myopic degeneration. Intraocular pressure was: O.U., 7 mm. Hg (Schiøtz). On May 13, 1937, more lens opacities were seen, particularly in the right eye. At this time, vision was: O.D., −28D. sph. = 1/6−; O.S., −20D. sph. = 1/6. By February 2, 1938, there were more nuclear opacities in both eyes. Intracapsular extraction with complete iridectomy was performed on the right. There was one secondary hemorrhage in the anterior chamber and in the vitreous. On March 5, 1938, vision was: O.D., −3D. sph. ⊃ +4D. cyl. ax. 150° = 1/6. On March 10, 1939, vision was: O.D., −2.25D. sph. ⊃ +3.5D. cyl. ax. 155° = 3/6; O.S., −20D. sph. = H. M. On April 5, 1939, an intracapsular extraction with iridectomy was performed on the left eye, with no vitreous loss. On May 29, 1939, vision in the left eye was 1/6 with a +0.5D. sph. ⊃ −3.5D. cyl. ax. 45°. On December 21, 1941, vision was: O.D., −2.25D. sph. ⊃ +3.25D. cyl. ax. 160° = 3/6; O.S., +0.5D. sph. ⊃ −4D. cyl. ax. 55° = 1/6.

Case 9. Mrs. G. B., a white housewife, aged 71 years, was first seen on August 5, 1943. She had always been myopic. Vision at that time was: O.D., −18D. sph. = 1/100; O.S., −20D. sph. = 5/100. A nuclear cataract was present in each eye, as were fluid vitreous with opacities and myopic chorioretinopathy. Intraocular pressure was: O.U., 10 mm. Hg (Schiøtz). Central scotomas were present in both eyes. An intracapsular extraction with iridectomy was performed on the right eye on September 14, 1943. On October 22, 1943, vision was: O.D., −1.0D. sph. ⊃ −1.0D. cyl. ax. 90° = 1/10+. On January 10, 1944, the capsule ruptured during an attempted intracapsular extraction with iridectomy of the left eye. Operation was followed by uveitis and after-cataract, and there was a slow convalescence. On March 27, 1944, the membrane and capsule were removed with a Tyrell hook through a linear section in the left eye. By June 10, 1944, vision was: O.D., −0.5D. sph. ⊃ −1.5D. cyl. ax. = 1/6; O.S., −2D. sph. ⊃ −1.5D. cyl. ax. 100° = 1/20. On September 10, 1945, vision was: O.D., −1.0D. sph. ⊃ −2.0D. cyl. ax. 95° = 1/10; O.S., −1.5D. sph. ⊃ +3.5D. cyl. ax. 25° = 1/10.

Case 10. B. C., a white mechanic, aged 53 years, was first seen on February 26, 1940. He had always been myopic. Vision at this time was: O.D., −13.5D. sph. ⊃ −7D. cyl. ax. 175° = 1/10; O.S., −8.5D. sph. ⊃ −4.5D. cyl. ax. 165° = 3/6. The interior of the right eye showed a dense nuclear cataract. There was a partial cataract in the left eye. Fluid vitreous with opacities and myopic fundi were also present. The intraocular pressure was: O.U., 18 mm. Hg (Schiøtz). On January 5, 1942, an intracapsular extraction with peripheral iridotomy was performed on the right eye. Vision on January 27, 1942, in the right eye was 3/6− with a +1.0D. sph. ⊃ +3D. cyl. ax. 95°. On August 12, 1943, vision was: O.D., +2.25D. sph. ⊃ +1.25D. cyl. ax. 110° = 4/6; O.S., +2D. sph. ⊃ −4.5D. cyl. ax. 155° = 2/6−. The left eye has not been operated on since the patient is satisfied with the use of the right eye.

Case 11. M. F., a white woman, aged 66 years, had been nearsighted for years. Vision was: O.D., −19D. sph. ⊃ −1.0D. cyl. ax. 180° = 6/100; O.S., −20D. sph. ⊃ −1.5D. cyl. ax. 165° = 6/100. Intraocular pressure was: O.U., 14 mm. Hg (Schiøtz). There were vitreous opacities, the vitreous was fluid, and posterior staphylomas were present. An intracapsular extraction with no escape of vitreous was performed on the right eye on December 10, 1946. Vision was 20/40 in the right eye on March 28, 1947, with a +3.5D. sph. ⊃ +3.25D. cyl. ax. 15°. The left cataract was removed by the same operative procedure in May, 1947.

Case 12. A. F., a white woman, aged 65 years, had always been nearsighted, but now there had been a constant fog before the left eye of 3 to 4 years' duration. The right eye had been blind for

some years due to an old uveitis with degeneration. Tension in the left eye was low, 8 mm. Hg (Schiøtz). The central light and color perception was faulty. Vision was less than 1/100. Projection was good. There was a dense, brownish nuclear opacity in the lens. The vitreous was evidently fluid, for very high myopia and a degenerated uvea were present. Intracapsular extraction with complete iridectomy were performed with no escape of vitreous and with the hyaloid remaining intact. Two months after the extraction, vision was 10/100 with a −4D. sph. The intraocular pressure was still 8 mm. Hg (Schiøtz). There was no detachment nor other untoward development. The patient was pleased with the improvement in her vision.

Case reports

Series 2

Report of surgery of cases of cataract and fluid vitreous and dehiscence of hyaloid capsulozonular-barrier with escape of fluid vitreous at the time of extraction of the cataract.

Case 1. W. B., was a white man, aged 39 years. The vision of the right eye had never been good, while that of the left eye had become poor within the past year. Physical condition showed a typical case of Marfan's syndrome of arachnodactyly with bilateral subluxation of the lenses and recently developed anterior and posterior subcapsular cataracts and recognizable fluid vitreous. Vision was: R.E., 1/100, with a −2D. sph.; L.E., 3/100, with a −10D. sph. ⊃ −2D. cyl. ax. 10°. Intraocular pressure was: O.U., 16 mm. Hg (Schiøtz). On December 19, 1945, an intracapsular extraction with use of forceps and loop was done on the right eye, and on January 3, 1946, the same operation was done on the left eye. Resulting vision was: R.E., +8D. sph. ⊃ +1.0D. cyl. ax. 90° = 2/6; L.E., +9D. sph. ⊃ +1.0D. cyl. ax. 90° = 6/6. The left eye was used alone as it had been previous to the operations. Exotropia of 40 degrees of arc continued.

Case 2. E. C., a white woman, aged 41 years, was first seen on August 6, 1942. She had always been nearsighted, but within the past two years her vision had become so poor that she could hardly get about by herself. History was negative except for a rather severe chronic purulent pansinusitis which every general and local effort had failed to cure. Physical examination showed a well nourished woman of middle age.

Vision was: R.E., 1/16 with a −7D. sph. ⊃ −1.0D. cyl. ax. 180°; L.E., 1/12 with a −12.D. sph. ⊃ −1.0D. cyl. ax. 180°. Corticonuclear cataracts were more dense in left eye. The color perception and peripheral fields for light and form were normal. The pupils measured 3.5 mm., reacting 1 mm. They dilated well with homatropine and paredrine to 8 mm. Tension was 18 mm. Hg (Schiøtz), O.U. Examination with slitlamp microscope was essentially negative. There were no deposits on the endothelium of the cornea except some old fine pigment dots; no floaters; no iridodonesis. Iris structure was normal. There was no heterochromia. Operations: O.S., intracapsular extraction with peripheral iridotomy on November 13, 1942; O.D., May 11, 1943. Then lens capsule was ruptured with the wire loop which was being used to strip off the zonule. Not all of the adherent cortex was removed. It was thought that a great part of the inflammation which developed in the right eye in the postoperative course was due to the toxic effect of the degenerated lens protein. In January, 1945, two months after the extraction, vision in the left eye was 6/6 − 1 with a +6.25D. sph. ⊃ +1.5D. cyl. ax. 53°. In January, 1944, six months after operation, vision in the right eye was 3/6; while one year after the surgery, vision in the right eye was 4/6 with a +8.5D. sph. ⊃ +2D. cyl. ax. 90°. In 1947, she had 6/6 vision in each eye with binocular single vision and stereopsis. The right iris was slightly atrophic, and there were some posterior synechias to a portion of the anterior lens capsule. The left iris appeared normal. The vitreous became quite clear in each eye.

Case 3. A. A., was a white man, aged 44 years, whose left eye had always been weak. For the past six years the vision of each eye had been practically useless. Vision was: R.E., 1/6 not improved by glasses but with good color perception and form field. The left eye had light perception, good light projection, and color perception. An operation on the left eye on March 20, 1945 combined an intracapsular extraction with peripheral iridotomy. The same was done on the right eye, September 11, 1945. The left eye had 6/12 vision in three months, with a +8.25D. sph. ⊃ +1.5D. cyl. ax. 15°. The right eye had 6/12 vision in two months with a +8D. sph. ⊃ +2D. cyl. ax. 175.° The irides appeared normal and in good plane, with no synechia apparent; the fluid vitreous was clear with no opacities.

About fifteen months after the extraction from the left eye and nine months after the extraction from the right eye, the ophthalmologist who had referred him to me and who had been very pleased with the result found that the intraocular pressure was elevated to nearly 60 mm. Hg (Schiøtz). There was very little redness and the vision with correction was reduced to 20/70 in the right eye, and 20/200 in the left eye. My associate in my absence found that medication failed to reduce the tension and performed a cyclodialysis with iridectomy in each eye. The tension in two months was: O.D., 22 mm. Hg, and O.S., 24 mm. Hg. Di-isopropyl-fluoro-phosphate (0.1 percent) was used later when the tension was found nearer 30 mm. Hg, with not very satisfactory results as far as normalizing of the tension was concerned. This has remained about 25 to 28 mm. Hg (Schiøtz), but the vision of the right eye with correction has been 3/6, and that of the left eye 2/6.

Case 4. A. E., a white man, aged 55 years, was first seen on April 30, 1945. His right eye had been normal, while his left eye had had an ulcer of the

cornea following a foreign body 18 years ago. Five years ago, while pounding on pipe, a piece of iron had injured but had not entered the left eye. X-ray films showed no intraocular foreign body. Recently the vision of the left eye had been very poor. Seven months ago he was told that he had a hemorrhage in the eye. He had been disturbed by large clouds before the left eye. The left eye was not congested. The cornea was clear except for minute pigment deposits on the endothelium. The aqueous was clear. There were no floaters; iris was normal; there was a small sized dense brownish cataract. Pupils were equal and both reacted to direct light. Vision was: L.E., good projection, with good light projection and perception of colored lights, R.E., 6/6 with a −0.25D. sph. ⊃ −0.37D. cyl. ax. 70°. Tension was 16 mm. Hg (Schiøtz) in each eye. Intracapsular extraction with peripheral iridotomy was performed on the left eye. The first test of vision was three months after the operation when it was: O.S., +8.5D. sph. ⊃ +3D. cyl. ax. 60°, 4/6+. The plane of the iris was normal. The aqueous was clear. The vitreous opacities were well posterior. The anterior vitreous was clear.

Case 5. L. B., a white man, aged 64 years, had always been quite myopic. Recently vision even with best correction was very poor. Vision was: R.E., 1/16 with a −20D. sph., L.E., 1/100 with a −14D. sph. Pupils were equal and reacted well to light. His general condition was excellent. Corticonuclear cataracts were denser in right eye. There was fluid vitreous with many fine and course floating opacities. Tension was 20 mm. Hg (Schiøtz) in each eye. An operation was done on the right eye, November 14, 1944. The seeping away of fluid vitreous continued until the lens was out, then viscid vitreous presented in the superior temporal portion of the incision. None was lost but the vitreous became incarcerated in the lips of the incision and upon healing the pupil was drawn up and displaced in this area. The vision of the right eye with a +1.0D. sph. ⊃ +2D. cyl. ax. 45° was 2/6 one month after operation. Because of the behavior of the right eye at the time of surgery it was decided to do an inferotemporal, posterior, scleral drainage of the left eye immediately before the extraction of the cataract from the left eye. On March 2, 1945, an operation on left eye was planned as above. Viscid vitreous was found in the posterior scleral drainage area. Fluid vitreous seeped away anteriorly after the incision and during the delivery of the cataract, but no viscid vitreous was lost or incarcerated. In two months the vision of the left eye was 1/5 with a −2.5D. cyl. ax. 175°. The final vision in each eye was very satisfactory. One year after operation vision was: R.E., 4/6 with a +0.75D. cyl. ax. 10°; L.E., 5/6, with a +2.25D. cyl. ax. 180°. The after history of the left eye is very interesting. On May 9, 1947, over two years after the extraction, the patient came to me complaining of loss of vision in his left eye. He had been performing extremely arduous labor, lifting heavy cases and helping to move machinery of great weight. Detachment of the retina was found. This was the only case in which this condition developed. The factor of the creation of an opening in the retina through which an attempt was made to drain the vitreous may well have been the cause. Surgery for reattachment of the retina is to be done. Certainly patients who have had a successful result after cataract surgery should be warned, as was this one, of the bad effects of undue strain upon an aphakic eye.

Case 6. W. J. W., a white man, aged 49 years, was first seen September 28, 1945. He was a clerical worker who had always been myopic. Vision was: O.D., −5.5D. sph. ⊃ −3D. cyl. ax. 10° = 1/12; O.S., −6D. sph. ⊃ −3D. cyl. ax. 180° = 2/6. On November 20, 1945, an intracapsular extraction with peripheral iridotomy was done on the right eye. No gel vitreous was seen. On December 10, 1945, vision was: O.D., +4D. sph. ⊃ +1.75D. cyl. ax. 100° = 4/6; December 21, 1945, O.D. +4D. sph. +2D. cyl. ax. 105° = 6/6.

Case 7. L. B., aged 60 years, rapidly developed cataract in the right eye. The left eye had been blind for 10 years from endophthalmitis, detached retina, secluded pupil, hypotony, cause unknown. The right eye showed no congestion; dystrophy of the endothelium with deposits of degeneration was present, as were floaters and slightly increased relucency. There was complicated cataract. Tension was 12 mm. Hg (Schiøtz). There was partly fluid vitreous with opacity and a tremulous lens. A few months after the first observation the cataract rapidly became complete; there were more floaters and more relucency of the aqueous. Light projection and color perception was not perfect. Due to the nature of the case, operation was decided upon. After cataract extraction which was easily accomplished and in which fluid vitreous seeped away, the eye appeared to heal well anteriorly but a detachment of the retina, which may well have been present at least in part before the extraction, was evident. The aqueous floaters and relucency were in this case significant of the pathologic condition in the posterior segment. The eye did not respond to later efforts to reattach the retina.

Case 8. E. R., a woman, aged 64 years, had a record of having been refused cataract operation for her better right eye by a number of surgeons because of ophthalmoscopic evidence of arteriosclerotic degenerative chorioretinopathy in the left eye. Her vision was: O.D., 10/200 with a −11D. sph., and O.S., faulty light projection. Tension was 13 and 12 mm. Hg (Schiøtz). Diagnosis of fluid vitreous was made. There were tremulous lenses. It was decided to remove the left lens first to learn the reaction of the eye. It healed well with a round pupil, despite escape of much fluid vitreous. Then the cataract was removed from the right eye with a good result of 6/9 vision with correction.

Case 9. E. McE., a white man, aged 62 years, had good functional tests and no remarkable evidence of degeneration before surgery. Tension was: O.U., 16 mm. Hg (Schiøtz). At the time of opera-

tion on each eye, excess fluid came away, apparently from the area anterior to and around the gel vitreous which presented but did not escape in either eye. Healing and vision after surgery were good. He had worn: O.D., −0.75D. sph. ⌒ −1.75D. cyl. ax. 45° = 1/100; O.S., −2D. sph. ⌒ −0.50D. cyl. ax. 20 = 6/100. The acceptance six months after operation was O.D., +7.5D. sph. ⌒ +3D. cyl. ax. 160° = 5/6; O.S., +7D. sph. ⌒ +2D. cyl. ax. 70° = 5/6. In 1946, he had 6/6 vision in each eye.

Case 10. M. R., aged 52 years, had had intumescent cataract of the left eye operated upon unsuccessfully, with loss of viscid vitreous complicated by iridocylitis (not of the sympathetic type) resulting in loss of the eye. Enucleation had been performed. Upon development of a cataract of the same type in the right eye, six months later, extra precautions were taken, including a perliminary iridectomy at the time of which fluid vitreous flowed away through the keratome incision. Tremulousness of the lens had been a constant feature since then. There were fine deposits on the endothelium (none of the mutton-fat type). The aqueous beam was normal. An occasional floater of varied type was seen. The subsidence of the intumescence for an easier intracapsular extraction was awaited and extraction was performed on May 6, 1947. Direct rupture of the zonule was necessary to effect delivery in the capsule because of the low intraocular pressure.

Comment

It is evident from analysis of these two groups of cases that there are points of difference. In the first group, the fluid vitreous was a complication of high myopia except in two cases, in whom the myopia was moderate, and in one, in whom uveitis caused the complicated condition. The second group are younger with an average age of 48 years. If Case 4, in which trauma was a factor, and Case 5, in which high myopia was present in an older individual, are excluded, the average age was 46 years. The visual results after operation in each group were remarkably good considering the complications.

Summary and Conclusions

Fluidification (synchysis) of the vitreous may complicate the formation of cataract. The degeneration of the vitreous may proceed from the normal viscid gel to a semi-

TABLE 2

SUMMARY OF REPORT ON CASES OF FLUID VITREOUS WITH ESCAPE AT TIME OF SURGERY FOR REMOVAL OF CATARACT*

Case	Name	Age	Tension	Refraction Before Operation	Eye	Refraction After Operation	Vision	Pupil
1.	W. B.	39	16	−2.00	O.D.	+8.00 +1.00 ax. 90	2/6	—
	W. B.	39	16	−10.00 −2.00 ax. 10	O.S.	+9.00 +1.00 ax. 90	6/6	—
2.	E. C.	41	18	−7.00 −1.00 ax. 180	O.D.	+8.50 +2.00 ax. 90	4/6	—
	E. C.	41	18	−12.00 −1.00 ax. 180	O.S.	+6.25 +1.50 ax. 53	6/6–1	—
3.	A. A. I.	44	—	—	O.D.	—	3/6 reduced by glaucoma to 3/6–1	
	A. A. I.	44	—	—	O.S.	—	3/6 reduced by glaucoma to 2/6–1	—
4.	A. E.	55	16	Not satisfactory	O.S.	+8.50 +3.00 ax. 60	4/6+	—
5.	L. B.	64	20	−20.00	O.D.	+.75 ax. 10	4/6	Interior synechia
6.	L. B.	64	20	−14.00	O.S.	+2.25 ax. 180	5/6	—
7.	W. J. W.	49	—	−5.50 −3.00 ax. 10	O.D.	+4.00 +2.50 ax. 105	6/6	—
	L. B.	60	12	−7.00	O.D.	Estimated aphakia +10.00	Hand movements	—
	L. B.	60	—	Blind, detached retina	O.S.	—	Complicated detached retina	—
8.	E. R.	64	13	−11.00 worn	O.D.	−4.00 +1.00 ax. 170	6/9	—
	E. R.	64	12	−11.00 worn	O.S.	+4.00	1/100	—
9.	E. McE.	62	16	−.75 −1.75 ax. 45	O.S.	+7.50 +3.00 ax. 160	5/6	Slight distortion of round pupil
	E. McE.	62	16	−2.00 ax. 20	O.D.	+7.00 +2.00 ax. 70	5/6	—
10.	M. R.	52	18	−3.75	O.D.	Operation preliminary iridectomy. Fluid vitreous		—

* 10 cases reported, 16 eyes operated upon. Ages 39 to 64 years. Tension from 8 to 20 mm. Hg (Schiøtz). Refraction from approximately −1.00 to −20D. sph. with cylinders. The average would be that of the lower degrees of myopia. The acceptance after extraction was corresponding. The degree of central vision was good after extraction, considering the type of cases and the complications. After healing, one patient had hand movements, one had 1/100. Both of these cases had known retinal pathology. One other eye had 2/6, 4 had 3/6, 4 had 4/6, 3 had 5/6 and 1 had 6/6. In the case of one patient, secondary glaucoma reduced the vision of one eye from 3/6 to 3/6—1 and of the other to 2/6—1. One eye with fluid vitreous has had only preliminary iridectomy, not having had the extraction of the cataract as yet. One patient evidently had detached retina before the extraction, which seemed indicated because of the complete blindness of the individual. One patient developed detachment of the retina two years after extraction. The factors of excessive strain of heavy lifting and arduous labor may have been at fault, but it is significant that in this case alone was the procedure of posterior drainage of the vitreous resorted to before the extraction.

viscid, semifluid, and fluid state. A portion of the vitreous may remain viscid or semiviscid, surrounded by fluid. The vitreous may be contained behind an intact hyaloid capsulozonular barrier or the latter may also be degenerated and a direct communication exist with the aqueous in the posterior and anterior chambers. The signs for recognition of both of these conditions are described. Particular stress is made of the signs of degeneration of the ocular tissues, hypotony, the type of deposits on the endothelium, the aqueous floaters and relucency, the form of the cataract, the character of the vitreous. The particular lead is to look for signs of degeneration of tissue before surgery for removal of cataract. If they are found, the inference should be drawn that the zonule is fragile and that the vitreous may be fluid. The causes of degeneration and fluidification of the vitreous—faulty nutrition, abiotrophy and senescence, myopia, trauma, inflammation, and detachment of the retina—are discussed in relation to the condition. The literature is cited, particularly in relation to the prognosis, surgical treatment, and results obtained.

The recognition of abnormal fluidity of the vitreous before operation or encountered at the time of surgery is a direct indication, in my experience, for intracapsular extraction. The usual tests of light and color perception and projection should be made and the prognosis based upon them and the objective condition of the eye. Hypotony with intraocular pressure below 8 mm. Hg (Schiøtz) and definitely increased relucency of the aqueous are signs of ill-omen. The cataract should be removed before hypermaturity and complete luxation, because of the attendant fragility of the zonule. The flowing away of the fluid vitreous and the partial collapse of the globe may cause some surgeons to abandon the extraction of the cataract after the section has been made, but in my experience atraumatic intracapsular extraction has given good results. The zonule is uniformly fragile in such cases. Extracapsular extraction is contraindicated in cases of fluid vitreous in communication with the anterior chamber, because of the hypotony which makes useless any maneuver involving pressure and because the eye does not heal as well with retained irritating cortex. If the lens is luxated into the anterior chamber, it can be removed directly. If luxated into fluid vitreous, the maneuvers of coaxing it into the anterior chamber or the methods of Verhoeff or Bracken may be used. If the hyaloid capsulozonular barrier is intact and the vitreous fluid, there is no contraindication to intracapsular extraction, with retention of the intact hyaloid even in cases of high myopia. When there are dehiscences in the barrier, with or without subluxation, intracapsular extraction with traction by forceps and direct rupture of the zonule by separating or stripping it from the capsule with a blunt instrument, such as the elbow of a lens expressor hook, has produced good results. In cases of subluxation, the loop or spoon may be used but it should be passed through an already existing break in the zonule and used to support the lens until the forceps grasp the lens capsule and support it while the loop or spoon is used to separate the zonule from the capsule.

I would not use direct traction with loop or vectis to rupture the zonule nor would I use pressure from without to slide the lens out on a flat spoon, except when the zonule is fragile. The use of the suction cup or erisophake is not indicated in cases of fluid vitreous in communication with the anterior chamber. It may be contraindicated if a direct application of the cup to the capsule is not feasible before the suction is applied. Preplaced sutures are not necessary or even indicated, as shown by experience, in the presence of fluid vitreous. Sufficient time may be taken for a calm, unhurried performance of the surgery, particularly in the toilet of the incision. A complete iridectomy is not necessary in cases of fluid vitreous, as the round pupil may be re-

tained, using two peripheral iridotomies. There need be no drawing up of the iris if there is no incarceration of viscid or semiviscid vitreous. Transplantation of viscid vitreous or replacement with spinal fluid or even with saline is apparently not necessary, although the latter may be used if there has been collapse of the globe. Two cases of detachment of the retina were observed in this series, but the condition in one existed prior to the development of the cataract. In the other, the detachment developed over two years after the extraction. The factors of heavy lifting and the presence of a hole in the retina produced by purposeful drainage of the vitreous prior to the extraction of the cataract from this eye have to be evaluated as the cause of the detachment. One case of bilateral postoperative glaucoma developed. This was only partially controlled by surgery and the use of di-isopropylfluorophosphate (0.1 percent).

A report of 10 case histories with operations on 16 eyes in which fluid vitreous was in communication with the aqueous and of 12 cases with operation on 22 eyes in which the hyaloid was intact is made. The results obtained indicate that in cases of fluidity of the vitreous with cataract in which the degeneration has not progressed too far and in which there is not a preëxisting detachment of the retina or severe hypotony the cataract may be removed by an atraumatic intracapsular technique with gratifying results.

Nothing that is said in this paper on fluid vitreous should be taken to minify the disastrous results of the rupture of the hyaloid and the loss of viscid vitreous.

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NOTES, CASES, INSTRUMENTS

AN UNUSUAL CASE OF LEPTOTHRICOSIS CONJUNCTIVAE*

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A 32-year-old white housewife was first seen at the out-patient department of the Massachusetts Eye and Ear Infirmary on December 25, 1946, complaining of itching of the right eye of two weeks' duration and redness of the eye associated with a painful lump in front of the right ear of three days' duration. She had been treated by her own physician for the past five days with ointment and drops without improvement.

Ocular examination revealed vision to be: O.U. 20/30—. The right eye showed slight redness of the lids with moderate swelling of the lower and marked swelling of the upper lid to the extent that the upper fornix could not be prolapsed. There was a scant, stringy mucoid discharge.

There was marked chemosis and swelling of the fornicial conjunctiva. The palpebral conjunctiva was congested and swollen. In the center of the palpebral conjunctiva of the lower lid was a grayish white, semitranslucent, mushroomlike, nonulcerated nodule measuring 3 by 2 mm. with a collarette of smaller daughterlike grayish deeper excrescences.

Several small follicles were seen near the outer canthus of the lower lid. The cornea was clear and did not stain with fluorescein. Findings in the remainder of the eye were negative. The right preauricular node was tender and swollen, measuring 1 by 1 cm. The left eye was entirely negative. Temperature was 99.2°F. A diagnosis of Parinaud's oculoglandular syndrome was made.

Laboratory findings. Conjunctival smears and scrapings were negative. Culture revealed nonhemolytic streptococci. Urine was negative.

Blood was: W.B.C., 8,300—77-percent polymorphs, 14-percent lymphocytes, 9-percent monocytes. R.B.C., 4,200,000; Hgb., 12.2 gm.

X-ray films of chest, teeth, and sinuses were negative.

Agglutination tests for brucella and tularemia were negative. T.B. skin test (1/20,000) was negative. Serology was negative.

Course. Three days after the initial visit, hemorrhage occurred into the nodule and it was removed for biopsy. The sections were reviewed by Dr. F. H. Verhoeff, who found the typical histologic picture and organisms of Leptothrix infection.

The tributary adenopathy became progressively more marked and diffuse. Thirteen days after first being seen at the clinic, the preauricular node measured 2 by 3 cm., and the whole right cervical chain was visibly enlarged and tender. The overlying skin was reddened. No definite fluctuation could be made out at this time, although the surgical consultants were of the opinion that the patient had a definite and marked cervical adenitis.

The blood at the height of the adenitis revealed a leukocytosis of 12,400 with 77-percent polymorphs and no eosinophiles. The adenopathy gradually regressed from below, but the preauricular node remained visibly and painfully enlarged. Approximately six weeks after the first visit, the preauricular node spontaneously discharged some "matter" while at home. The following day 3-cc. thin, greenish purulent material were aspirated from it. This material was bacteriologically sterile. Modified Verhoeff gram staining revealed no filaments or other organisms, and special cultures for Leptothrix were negative after one month's incubation. Guinea-pig inoculations of the aspirated material were negative for tuberculosis. The preauricular gland gradually regressed in size and again spontaneously drained some pus about one month later. Three months after the onset of the disease,

* From the Massachusetts Eye and Ear Infirmary.

the gland was still slightly enlarged and indurated but no longer painful.

The eye signs of redness, chemosis, and edema gradually regressed so that five weeks after the onset of the disease the lids were normal and only slight chemosis and simple conjunctival injection remained. This had cleared completely three weeks later.

During the illness the patient's temperature had ranged from 98.6°F. to 100°F., being highest at the height of the cervical adenopathy. General symptoms—mild lassitude, chilliness, and headache—closely paralleled the temperature variations. With the exception of the ocular and associated findings, physical examination was negative.

Treatment. This was symptomatic and consisted of aspirin, cold compresses to the glands, and zinc and adrenalin eye drops.

Comment

This case of leptothricosis conjunctivae was of particular interest to us for the following reasons:

1. The occurrence of suppuration of the preauricular node, which does not usually occur in this condition, and the spontaneous drainage, which to our knowledge has not been previously reported.

2. The occurrence of hemorrhage into the conjunctival nodule which we have not seen before either in this condition or in tubercle of the conjunctiva.

243 Charles Street (14).

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PARALYSIS OF SUPERIOR RECTUS AND INFERIOR OBLIQUE FROM DIABETES MELLITUS

Henry L. Hilgartner, M.D.
Austin, Texas

Paralysis of the superior rectus and the inferior oblique muscles in one or both eyes is relatively rare. In cases in which ocular paralysis does occur, one immediately thinks of syphilis as the etiologic agent. Until the Wassermann test was developed, all cases of ocular paralysis in the adult were considered syphilitic in origin unless other definite causes could be established.

In 1930, James Collier reported a number of cases of paralysis of the oculomotor nerve-trunks in diabetes, and I wish to report one case in which paralysis of the superior rectus and inferior oblique muscles developed in a diabetic who had syphilis some 15 years previously. In discussing diabetic involvement of the oculomotor nerve trunks, it is well to remember that diabetes also affects the retina and the optic nerve rather frequently.

White reported on the paralysis of the superior rectus and the inferior oblique muscles of the same eye, in 1941. He stated that paralysis of both elevators of one eye, although one of the less common palsies, is not infrequently seen and is generally, if not always, congenital. His discussion dealt with the surgical treatment of these cases, and the patients were all children.

Report of a case

J. H., a Negro man, aged 62 years, was first seen on January 7, 1947, with the complaint that he was unable to open both eyes simultaneously. About December 1, 1945, the patient suddenly noticed that when he opened the right eye, the left upper lid would close, and vice versa. He was able to open both eyes at times, but saw double. There was no pain at any time. His only other complaint was that the stump of his left leg, which had been amputated, was painful.

History. The patient was first seen at the Brackenridge Hospital Clinic in 1931, complaining of a urethral discharge of three weeks' duration. The patient underwent proper gonorrheal treatment and was cured. A Wassermann test made at the time showed a plus-four, positive reaction. He was treated

regularly for syphilis in the Clinic, and the blood and spinal fluid became negative.

In 1935, the patient's left leg had to be amputated above the knee, following an accident. He had had a great deal of trouble with a painful stump, which had been operated on several times.

About 1940, the patient developed a severe diabetes and had been treated in the Brackenridge Hospital Diabetic Clinic since then. Insulin and diet had been more or less effective in keeping the blood sugar near normal levels. Occasionally he would break his regime, and the blood sugar would go up to over 200 mg. per cc.

Eye examination. Vision was: R.E., 20/60; L.E., 20/20. The eyes were normally prominent, and the pupils reacted to light and accommodation. When the patient opened the right eye, the left upper lid closed, and vice versa. By raising the right upper lid manually one noticed that the pupillary levels of the eyes were not the same. On having the patient look in the cardinal directions, the left eye moved normally. The right eye moved normally in the horizontal axis and in the lower-temporal, lower-central, and lower-nasal directions. He was unable to elevate the eye above the midline. Both fundi were essentially normal except for moderate arteriosclerosis.

Laboratory reports. On January 7, 1947, a blood Kahn and Wassermann were run and reported negative.

On January 16, 1947, spinal fluid was examined for syphilis and reported negative. Spinal-fluid sugar was 198 mg. percent. On January 21, 1947, the patient was placed on Mead's brewers yeast tablets, four times daily after meals, in addition to the insulin and diet regime that he had been on.

By March 11, 1947, the patient could open both eyes simultaneously, alone, with no effort. He did this, however, only when requested. The right eye could be elevated slightly above the horizontal line.

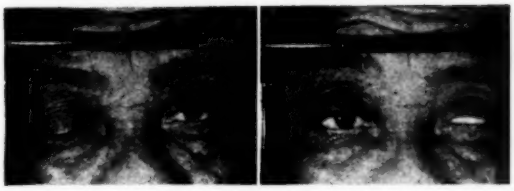

Fig. 1 (Hilgartner). (Left). Usual appearance with right eye closed and left eye open. (Right). Appearance when right eye is opened. Left upper lid practically closes, and left eye turns up.

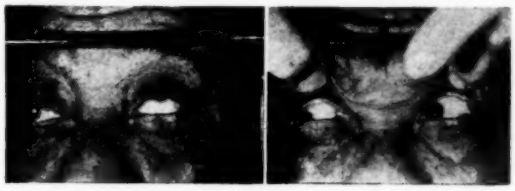

Fig. 2 (Hilgartner). (Left). Forcing both eyes open. Note wrinkling of brow, turning up of left eye, and drooping of left upper lid. (Right). Looking to right in midline. Right eye can be seen moved to the right.

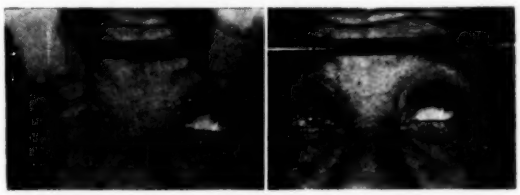

Fig. 3 (Hilgartner). (Left). Left eye elevated up and out. Right eye extended nasally but not above the midline. (Right). Left eye extended up. Right eye not elevated above the midline.

Diagnosis. Paralysis of superior rectus and inferior oblique due to diabetes.

Comment

In conclusion, a case of paralysis of the superior rectus and the inferior oblique muscles of the right eye, due to diabetes, has been reported. Contrary to the statement of Collier that most of these cases improve on regular diabetic treatment, this patient has not improved up to the present time.

202 West 13th Street.

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A MODIFIED ERISOPHAKE*

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Key West, Florida

A modification of the erisophake is reported, which has the following advantages:

1. It is light, small in size, and easy to handle.
2. The suction is easily controlled.
3. It is simple and inexpensive.

The tip is modeled after those of Dimitry and Castroviejo, and either of these tips

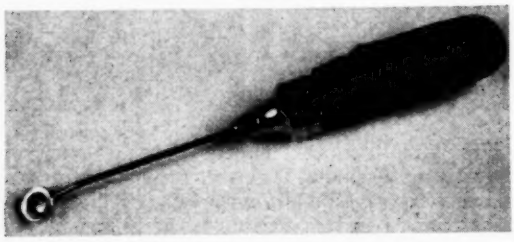

Fig. 1 (Bell). A modified erisophake.

may be used. The suction is provided by a small rubber bulb made from a contact-lens holder by cutting off the flexible lip. The working volume of the bulb (approximately 0.25 cc.) is ample, if the instrument is filled with normal saline solution prior to grasping the lens. The maximum vacuum is 60 to 70 cm. Hg, approximately equal to that provided by the Barraquer and Castroviejo vacuum pumps. The bulb is rugged and inexpensive and will stand many boilings. To sterilize them, the tip and nipple should be disassembled and boiled. If assembled when boiled, the rubber bulb will tend to adhere to the metal tip.

Before the operation, the instrument should be assembled and completely filled with normal saline. This is important, because if any air remains in the instrument, it will prevent the attainment of a high vacuum, and bubbles of air will be introduced into the anterior chamber, obscuring the operator's field of vision. The bulb should be squeezed, expelling as much of the saline as possible, when grasping the lens. This will provide a better grasp on the lens, as well as clear the anterior chamber of any blood or iris pigment and sweep the iris anterior to the erisophake cup.

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* From the Wilmer Ophthalmological Institute of the Johns Hopkins Hospital and University.

A SCREEN FOR PRISM COVER TEST

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Stamford, Connecticut

The screen about to be described was designed primarily for the prism (alternate) cover test, but may also be used to measure the near point of convergence or PcB.

It is 6-cm. wide and 15-cm. long, made of black X-ray film, with rounded corners. Notches on the sides mark it off in centimeters. Each fifth notch is deeper so that the right measurement may be quickly read in any position.

The advantages are many. The screen does not look soiled with handling. The width is just enough to occlude the eye properly, without requiring too much accuracy so that full attention may be devoted to observing ocular movements. The length is convenient not only in manipulation but in giving an even number of 5-cm. (notch) gradations so that measurements can be easily read off from any position or angle without the use of printed numbers or calculation.

Over-exposed X-ray film is plentiful, costs nothing, and is easily and quickly shaped into the above design.

Bradding together two films for increased rigidity, and using numbers or pinholes instead of notches were among the variations tried. None, however, were found so handy or practical as the simple model described.

65 South Street.

A SIMPLE METHOD OF PHOTOMICROGRAPHY*

EDWIN S. WRIGHT, M.D.
Los Angeles, California

At present, photomicrography is usually confined to the larger institutions where costly equipment may be found and special technicians are maintained. Such laboratories frequently use the optical bench to produce the photographs. Good photomicrographs can be taken with relative ease, with a minimum of equipment, and in little time.

Theoretically, all one needs is a microscope and a camera. Light rays emerging from the ocular of the microscope are parallel, if the observer is emmetropic or rendered so by the proper spectacle lens. When the camera focused for infinity is set on top of the microscope the rays of light should focus exactly on the film. In practice, this method is wasteful of time and film since the observer is rarely exactly emmetropic and the slightest error produces a blurred picture. A focusing apparatus that permits a direct view of the slide to be photographed is advantageous.

EQUIPMENT

The Exacta and other reflex cameras permit such a direct view and their use speeds the work. However, these cameras are very expensive and not readily available so that for ordinary use a copy attachment has been chosen as the simplest method. The apparatus chosen has the following advantages:

1. All around usefulness of 35-mm. equipment.
2. Direct-view focus of the slide.
3. Simplicity of lighting system.
4. Relatively inexpensive equipment.
5. All materials are readily available.
6. Photomicrographs in true color are as easy to take as black and white.
7. The same equipment may be used to photograph the anterior segment (fig. 3A).

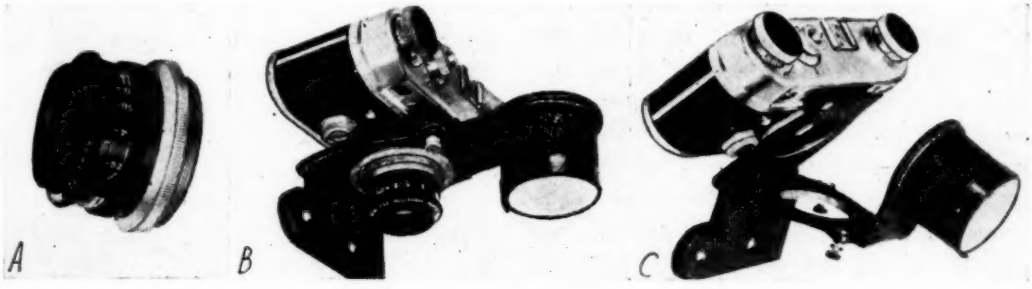

Fig. 1 (Wright). (A) Lens barrel dismounted from camera. (B) Lens mounted in lens plate of copy attachment. (C) Camera back mounted on camera plate of copy attachment.

The necessary items are:

1. A 35-mm. camera with focal plane shutter.
2. Copy attachment, preferably hinged type.
3. Camera support.
4. Connector.
5. Number-one photoflood bulb in any kind of lamp socket.
6. Ordinary microscope of standard make.

METHOD

After loading the camera with the desired film, the lens barrel (fig. 1A) is unscrewed from the camera and mounted in the lens plate of the copy attachment (fig. 1B). The camera back is mounted on the camera-back

* From the Department of Ophthalmology, Northwestern University Medical School.

Fig. 2 (Wright). (A) Assembly mounted on support. (B) Focusing with ground-glass image. (C) After focusing, the ground glass is raised and the camera back is lowered into position.

plate of the copy attachment (fig. 1C). The assembly is mounted on the support (fig. 2A). The slide is placed on the stage and roughly focused on the desired area. The camera-copy assembly is gently lowered to the microscope connector and the slide is focused by means of the ground glass on the copy attachment (fig. 2B). The ground glass is raised and the camera lowered into its place and the picture made (fig. 2C).

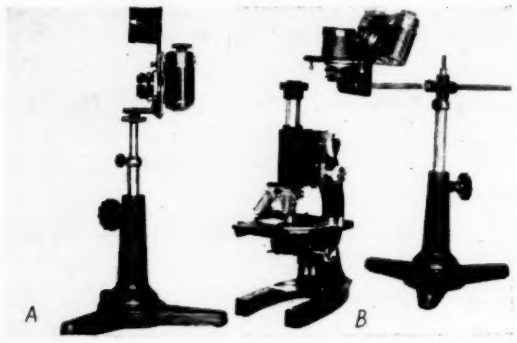

Fig. 3 (Wright). (A) Camera is set up for anterior-segment photography. (B) Shows camera assembly, microscope, and connector.

The light system is a number-one photoflood lamp placed about three feet from the concave mirror of the microscope whose condenser is opened fully and then closed until the light in the field of view just begins to dim. For black and white, using Eastman Super-XX film, about 1/30 of a second is required for a slide of average density. For Kodachrome type-A film, about one-half second of exposure is required. Thin slides require 1/5 second. These slides project nicely.

The connector is a short metal tube, or it may simply be a piece of black paper pasted around microscope and camera lens (fig. 3B). It need not be absolutely light tight. Pictures taken with high or low power require the same time of exposure, although the diaphragm of the condenser must be opened wider for high-power photographs. Critical focusing with the ground glass is facilitated by study of the ground-glass picture with a hand magnifying lens.

511 South Bonnie Brae.

SOCIETY PROCEEDINGS

Edited by DONALD J. LYLE, M.D.

NEW YORK SOCIETY FOR CLINICAL OPHTHALMOLOGY

April 7, 1947

DR. BENJAMIN FRIEDMAN, *president*

This meeting, the annual round-table discussion, was devoted to the discussion of the "Clinical Aspects of Ocular Pathology." Questions were submitted before the meeting, and were edited and divided among the following ophthalmologists, who comprised the panel of experts: Dr. J. Arnold de Veer, Dr. Joseph Igersheimer, and Dr. Algernon B. Reese. Dr. Benjamin Friedman acted as the moderator.

IN WHAT WAY MAY ENDOPHTHALMITIS PHACO-ANAPHYLACTICA BE RELATED TO SYMPATHETIC OPHTHALMIA?

DR. J. ARNOLD DE VEER said that there are several respects in which injury of the lens may contribute to the development of sympathetic ophthalmia. The proponents of the "infectious" theory of sympathetic ophthalmia have occasionally referred to the possibility that lens substance may serve as a culture media for bacteria and so play a role in the development of sympathetic ophthalmia.

Inclusion of lens capsule in a wound has repeatedly been mentioned, along with inclusion of uveal tissue, as a possible factor. Long before Verhoeff and Lemoine attributed certain inflammatory conditions to an "anaphylactic" reaction to lens protein, it was well known that protracted inflammations occasionally followed retention of lens material after cataract extract and that whatever can cause an iridocyclitis can indirectly bring about sympathetic ophthalmia. So, in a nonspecific way, the lens has been thought to be concerned in sympathetic ophthalmia by a number of observers.

Before 1940, no one had suggested that sensitization to lens protein might be a direct precursor of sympathetic ophthalmia in certain cases. In these cases, there has usually been one or more injuries or operations involving the liberation of lens protein. Inflammation in one eye has been followed by irritation or inflammation of the other eye. Examination of the enucleated, exciting eye has shown features both of endophthalmitis phaco-anaphylactica and of sympathetic ophthalmia. The theory advanced by Dr. de Veer is chiefly on morphologic evidence. It is that these people had first become sensitized to lens protein, and developed an allergic type of uveitis and subsequently became sensitized to uveal pigment. This theory still awaits serologic or experimental proof. Dr. de Veer stressed that the lens may play an important role in the development of sympathetic ophthalmia, whether as a source of antigen, as food for infection, as a toxic irritant, or in other ways.

Discussion. Dr. Joseph Igersheimer asked Dr. de Veer whether he would comment on the conception of autoanaphylaxis and its relationship to endophthalmitis phaco-anaphylactica.

Dr. de Veer replied that lens protein is one of the antigens described as organ specific rather than species specific. The idea that certain inflammatory lesions of the eye might be the result of sensitization of the individual to its own lens protein was advanced by Verhoeff and Lemoine, in 1916, and has never been fully accepted, chiefly because lens substance is a weak antigen, and it has been impossible to produce any convincing experimental support of the theory. In 1934, however, Berkey struck upon

a method of augmenting antigenicity by the use of some adjuvant substance, notably staphylococcus toxin. By the intradermal inoculation of rabbits with lens antigen and this toxin, either in separate skin sites or combined, he succeeded for the first time in rendering rabbits highly sensitive to beef lens substance. When the lenses of these rabbits were then needled, so that some of their own lens substance was released, intense inflammations ensued rapidly. Sections of these eyes were reported by Friedenwald to show changes resembling endophthalmitis phaco-anaphylactica in man.

With this experimental support and the histologic evidence furnished by clinical material, there has been rather general acceptance of the fact that reactions of the type described by Verhoeff and Lemoine have at least an allergic aspect, although infection and toxicity of lens substance may also be concerned in the pathogenesis of the lesion. Dr. de Veer said that he believed that sensitization to lens protein plays the predominant role in endophthalmitis phaco-anaphylactica and that sensitization to uveal pigment and sympathetic ophthalmia may supervene. In other words, people who have become sensitized to lens antigen are more prone to develop sympathetic ophthalmia than those who have not suffered such an immunologic disturbance.

Is sarcoid a type of tuberculosis?

Dr. Joseph Igersheimer said that his personal experience with sarcoid is very limited and he felt that this is true of most ophthalmologists. Very few cases of sarcoid of the eye have been studied anatomically and published. The whole question of the relationship between sarcoid and tuberculosis cannot be decided by the microscopic picture alone.

The histologic picture of Boeck's sarcoid is characteristically nodular in form. It is composed mainly of epithelioid cells with a few giant cells, lymphocytes, and marked fibrosis. The lack of caseation or necrosis is particularly suggestive.

Heerfordt's uveoparotid fever and Mikulicz's syndrome belong to the same group as Boeck's sarcoid. The fact that all these diseases show a tuberculoid formation cannot be used as positive evidence that they have a tuberculous origin since we know that allergic reactions in general often cause nodules of epithelioid character.

It is not the pathologic picture alone but the combination of the clinical entity plus the microscopic changes which are important in the pathogenesis. The negative tuberculin reaction in high concentrations, the absence of Koch's bacilli, and the lack of any form of caseation are the main but not the only facts which suggest that sarcoid and similar diseases are not due to an infection caused by Koch's bacillus, but to another infectious agent which we have not yet discovered. On the other hand, it must be admitted that in a relatively small number of cases of sarcoid, tubercle bacilli are found, inoculations are positive, and caseation is present. Therefore, the whole question of the relationship between sarcoid and tuberculosis cannot be answered in a positive way.

Can malignancy be diagnosed on a study of the subretinal fluid?

Dr. Algernon B. Reese said that Meissner, Rintelen, and others have been able to demonstrate the presence of cancer cells in the centrifuged subretinal fluid in cases of malignant melanoma of the choroid. Tumor cells cannot get into the subretinal fluid in cases of melanoma of the choroid until the tumor has perforated the lamina vitrea. In early cases this has not taken place, and it is these cases which may be difficult to diagnose.

Dr. Reese said that there are pigment epithelial cells which proliferate readily in the subretinal fluid and which he felt would be difficult to distinguish from tumor cells. He did not believe that the withdrawal of

subretinal fluid for the purpose of identifying tumor cells was of any value diagnostically.

Cibis found a positive melanin test for the subretinal fluid in cases of malignant melanoma of the choroid. Similar tests were negative for the aqueous, vitreous, and subretinal fluid in idiopathic detachments. Cibis felt that this test was of diagnostic value. Dr. Reese said that he has never used it and doubted its validity.

Dr. Reese said that it is sometimes advantageous to drain the subretinal fluid in order to unmask a melanoma lurking in the choroid. Sometimes this can be accomplished by putting the patient to bed with absolute rest for several days and in rare instances it is advisable to withdraw the fluid with a syringe.

Discussion. Dr. Benjamin Friedman asked if, when the eye is tapped, there is any danger of cells being left in the conjunctiva and whether these cells could lead to a secondary growth in the conjunctiva. Dr. Reese replied that he did not believe that there was any danger of this happening.

Pathologic findings in cases of retained nonmetallic foreign bodies

Dr. J. Arnold de Veer said that he believed it to be axiomatic that even the most inert foreign bodies excite some foreign-body granulomatous reaction. The more intense inflammations come from foreign substances that are more or less soluble in tissue juices, but even such insoluble substances at talc, glass, or coal dust call forth a mobilization of macrophages that leads to fibrosis. Infection may, of course, be carried into the tissues with the foreign bodies, and the traumatic hemorrhage, necrosis of tissue, hyperemia, and edema incident to the entrance of the foreign body furnish food for the infecting organism.

Although infection may not be introduced at the time of entrance of a foreign body, the fibrosis that results from the trauma of introduction, plus the fibrosis about the foreign substance itself, present areas of modified circulation and other structural and functional abnormalities that may invite endogenous infection.

Many nonmetallic foreign substances may be tolerated within the eye for indefinite periods of time. The clinician must weigh the risk of removal against the risk of leaving the foreign body within the eye.

A type of delayed, posttraumatic glaucoma is known to occur occasionally months or years after introduction of a "nonirritating" foreign body of even minute size.

The problem of identification of a nonmetallic foreign body in an enucleated eye may tax the diagnostic acumen of the pathologist. Glass, cilia, or displaced fragments of lens are relatively simple. Various vegetable structures call for a knowledge of plant histology.

Are there any histologic ocular findings that one can definitely classify as exclusively luetic?

Dr. Joseph Igersheimer replied that there are no histologic findings exclusively characteristic of syphilis. In the early stages, plasma cells are often present abundantly and, in the later stages, giant cells and vascular changes are often found, but all such findings are not pathognomonic.

Discussion. Dr. de Veer remarked that, if there is a real gumma in the eye, you can often give a histologic diagnosis of lues. He said that his reports usually read, "infectious granuloma, probably lues or tuberculosis." Then a serologic or bacteriologic confirmation is sought.

Histologic criteria in determining rate of growth of choroidal sarcoma

Dr. Algernon B. Reese said that Callender gave a cytologic classification of melanomas of the uvea into spindle-cell A and B, fascicular, necrotic, epithelioid, and mixed. The spindle-cell and fascicular types were

the least malignant and the epithelioid and mixed types the most malignant.

Wilder has reported the use of the reticulum content of melanomas as a criterion. Tumors in which the reticulum content or argyrophile fibers are greatest are less malignant than the tumors in which the reticulum content is less. The principle involved here is that the more rapidly a tumor grows the more anaplastic it is, and the less the cell produces its by-product.

The melanomas of the uvea are divided into the neurogenic and the chromatogenic melanomas.

Incidence of intraocular tumors in blind eyes

Dr. J. Arnold de Veer said that he was not able to answer the question from the standpoint of personal experience of any statistical value. The question of etiologic factors in development of malignant melanomas arises in these cases. Leber and Krahnstöver, in 1898, reported 22 cases in which inflammation seemed to have preceded development of the tumor. In most instances, however, the tumor has been the cause of the phthisis.

Dr. de Veer said that it can be stated without exception that phthisical eyes always show inflammation. He said that he had seen many examples of malignant melanoma in phthisical eyes, and felt that chronic inflammatory and profound local metabolic disturbances in some of these cases may have been casually related to the development of malignancy just as chronic irritation is believed to cause malignant changes in nevi of the skin.

The question of the relationship of injury and the development of malignant melanoma is a difficult one. If, as is commonly thought, partial removal of a pigmented mole of the skin may cause the remaining nevus cells to take on a malignant character, perhaps an injury that produces blindness can be credited with the subsequent development of an intraocular tumor. There is a tendency today to view this question of activation of growth of nevi, by operation or other trauma, in a different light than heretofore. It is thought that the nevus that shows obvious malignancy after incomplete removal was probably already malignant at the time the operation was undertaken.

At any rate, continued Dr. de Veer, the fact that a malignancy, impossible to detect early, may develop into a hopelessly blind eye is one of the best reasons for urging removal of such eyes. Furthermore, the phthisis may have been caused by an unsuspected malignant tumor. Estimates of the incidence of malignant tumors in phthisical eyes run as high as 10 percent. For similar reasons, eyes with absolute glaucoma in which the fundus cannot be seen, may harbor malignant tumors and so should be enucleated.

Discussion. Dr. Joseph Igersheimer said that it would be wise to consider the possibility of an intraocular tumor when one eye is blind and when the fundus is not visible. E. von Grosz published, in 1929, the following interesting figures: Among 4,004 enucleations during a period of 25 years, there were 200 eyes which were diagnosed as having uveal sarcoma. In 68 cases of blindness, there was only a suspicion of a tumor, and a tumor was found in 26 of these cases. Among the enucleated blind eyes with no suspicion whatsoever of a tumor, 25 cases of sarcoma of the uvea were found anatomically.

Why do inflammatory lesions of the posterior segment heal with fewer complications than those located anteriorly?

Dr. Joseph Igersheimer said that we must first consider the uvea, because the consequences of healing the exudative stage are most important. The dangers of a fibrinous exudate getting into the anterior and posterior chambers from the vessels of the iris and ciliary body are well known, and it is not necessary to describe them. In the choroid, these exudates are generally very limited in

size and space. If they are in a small area and the inflammatory process extends to the pigment epithelium and the outer surface of the retina, a microscopic retinal detachment may be present. Large exudates and large detachments as in Harada's disease are very infrequent occurrences. Even if involvement of the retina takes place in many small areas, as in disseminated choroiditis, the lasting visual disturbances are generally not great, unless the macular region is involved.

Several factors, anatomic as well as physiologic, are probably instrumental in causing the difference in behavior of the anterior and posterior segments of the uvea.

Anatomically, it is the glass membrane bordering the choroid which resists the spread of inflammation to a rather high degree, as does Descemet's membrane in corneal infiltrations. The iris and the ciliary body do not have such a natural barrier.

Physiologically, the pressure on the outside of the blood vessels may play a role in the amount of fluid and fibrin passing through the vessel wall. It is apparent that the choroid is naturally compressed by the sclera on one side and the pigment epithelium plus the retina on the other side. In the iris there is no counterpart on either side; in the ciliary body, on one side only. This point may be of some importance in cases where the inflammatory process is very severe, but is mainly restricted to the uveal tissue itself. Tuberculous nodules for example generally grow larger in the anterior uvea than in the choroid.

In discussing the posterior segment, inflammatory processes in the retina proper must be considered. Here the inflammation can be very severe, as in endophthalmitis. Necrosis of the retinal elements follows quickly, and the healing consequences are as bad as in the anterior segment. If the inflammation is mild and is restricted to some septic emboli, the complications may be insignificant because the tissues of the retina have little or no inflammatory response, and the little embolus may cause only a microscopic necrotic reaction in its surroundings.

Discussion. Dr. J. Arnold de Veer commented on the apparent ease with which exudate gets out of the ciliary body and into the vitreous, particularly from the pars plana and the region of the ora serrata. Why that should be so is not entirely answered by the statement that there is a glass membrane behind the ora serrata and none anterior to it. The two layers of the lamina vitrea are represented in the ciliary body, but there is a connective-tissue layer interposed between them. If these two membranes, the cuticular and the elastic membranes, are as represented in the textbooks, it is remarkable that cells can migrate through them in their separated positions any more easily than through the lamina vitrea, where these two layers are fused. Perhaps the answer is that these glass membranes in the orbicular region of the ciliary body are fenestrated, or perhaps they are easily broken during inflammations, so that inflammatory cells stream out into the vitreous, pass forward along the zonular fibers, and give rise to the cyclitic membranes that are so destructive.

Dr. de Veer concluded that an investigation of the glass membranes in the ciliary body, by means of maceration preparations, would be worth while.

Potential malignancy of pigmented lesions of conjunctiva

Dr. Algernon B. Reese said that there are two types of tumors to be considered here. One is the nevus and the malignant melanoma which arises from it, and the other is precancerous melanosis and the malignant melanosis which arises from it.

The nevus is a congenital tumor, extremely common, and it is an extremely rare occurrence that it gives rise to a malignant melanoma. When this does occur, the malignant tumor is localized and elevated.

Precancerous melanosis is an acquired lesion, usually appearing at the age of from 40 to 50 years. It is diffuse and nonelevated

and characteristically gives rise to a malignant melanosis in from 5 to 15 years. This tumor stems from the basal layer of the epithelium.

Dr. Reese said that, in his experience with these tumors, he has found that cancerous melanosis which arises from a precancerous melanosis is at least 15 times more common than the malignant melanoma which arises from a nevus.

Clinical criteria for differentiating benign from malignant tumors of the iris

Dr. J. Arnold de Veer said that there should be close and careful observation of all nevi. Those in the iris should be under the observation of an ophthalmologist. Notations should be made of size, shape, color, exact location, and degree of vascularity. Continued growth, especially after a period of quiescence should be viewed with suspicion. Changes in the degree or pattern of the vascularity or the development of glaucoma in such an eye should arouse great suspicion. The nonpigmented nevus should be watched as carefully as the pigmented one.

Dr. de Veer said that he was glad to see the designation "pigmented nevus" replacing the term "melanoma" in ophthalmic literature. Melanoma for several decades has been used in general pathology to designate a malignant tumor of melanoblastic cells. The addition of the word malignant would seem a wise precaution. The designation "melanosarcoma" is being dropped from ophthalmic parlance and that of "malignant melanoma" substituted. The term "leukosarcoma" is also troublesome. In general oncology it means lymphosarcoma accompanied by a leukemic blood picture. The name "nonpigmented malignant melanoma" should replace that of "leukosarcoma" in referring to pigment-free malignant melanoblastic tumors of the eye.

Differentiate histologically between luetic and tuberculous keratitis

Dr. Joseph Igersheimer said that the opportunity to examine an interstitial keratitis histologically is extremely rare. If only the cornea is examined under the microscope, it may not be possible to decide whether the keratitis is of luetic or tuberculous origin. Nevertheless, there is a great difference between the two and this can be understood best if the problem is approached from an experimental angle.

If luetic material is injected into the cornea of a rabbit, an interstitial keratitis will develop after a certain incubation period. This keratitis is generally not in the region of the injection. If tubercle bacilli are injected into the cornea, a yellowish infection will appear at the site of the injection after a few days; this infiltration becomes larger and nodular and may be followed by ulceration or perforation of the cornea.

If spirochetes are inoculated into the anterior chamber a typical interstitial keratitis results; whereas, after inoculation of tuberculous material a specific nodular process develops first in the iris, and later on a caseating process develops in the cornea.

If the syphilitic infection is made somewhere else in the body, as in the testis, and if the eye becomes involved, a typical interstitial keratitis appears after several weeks. Often no other pathologic condition of the eye can be found even histologically. If tubercle bacilli are injected intravenously, a uveal tuberculosis frequently results, but very rarely and only in severe tuberculosis of the anterior uvea does the cornea become involved. In such a case, the corneal disease can have the clinical and histologic appearance of an interstitial keratitis.

With rare exceptions the same process exists in pathologic conditions in human beings. According to his experiences, Dr. Igersheimer said that a luetic interstitial keratitis is primary, which means it is independent of

other inflammatory foci in the eyeball. Tuberculosis affects the cornea either in the form of a nodular keratitis or an interstitial keratitis, but this interstital keratitis is always secondary to a specific process in the sclera or the anterior uvea. Dr. Igersheimer demonstrated a case of interstitial keratitis with tuberculosis of the iris.

Dr. Igersheimer also demonstrated with lantern slides one histologic peculiarity of luetic keratitis. He said that experimentally, as well as in human cases, he had found new formations on the posterior surface of the cornea. They appeared clinically like large Descemet precipitates, but histologically they were proliferations of the corneal endothelium. The interesting point was that in several of the experimental cases, a large number of spirochetes could be detected in these endothelial new formations.

Intraocular complications in cataract extractions

Dr. Algernon B. Reese said that the following complications were common to both intracapsular and extracapsular cataract extraction:

1. Choroidal detachment. The immediate type is due to loss of volume in the eyeball. The late type, which comes on several weeks or more following the operation, is probably due to a leaky wound.

2. Epithelization of the anterior chamber. This may be in the form of a localized cyst due to the impregnation of isolated epithelial cells in the anterior chamber. It may be in the nature of epithelium lining a portion of the anterior chamber or the posterior chamber. This is due to the ingrowth of epithelium at the wound and is perhaps encouraged by the incarceration of iris or capsule in the wound.

3. Various types of operative sections.

4. Glaucoma.

5. Postoperative inflammation, which may be early and ectogenous in character, or late and endogenous in character.

6. Prolapse of the iris.

In regard to the extracapsular extraction, by far the most common and serious complication is capsule in the wound. The subcapsular epithelium proliferates into large plaques of metaplastic tissue and gives rise to various types of complications.

In regard to the intracapsular extraction the following were discussed by Dr. Reese:

1. The protrusion of the anterior hyaloid membrane across the anterior chamber to touch the corneal surface.

2. Adhesion between the lens capsule and the anterior hyaloid membrane (ligamentum hyaloidea capsularis). When actual adhesions exist between the two, an intracapsular extraction causes a tearing of the anterior hyaloid membrane and thus gives rise to loss of vitreous.

3. A detachment of the retina due to the fact that the dislocation of the lens causes a hole to be pulled in the retina at the ora serrata because some of the zonules insert into the ora.

Obligations of pathologist to furnish unprejudiced opinions and of clinician to provide adequate clinical information

Dr. J. Arnold de Veer said that it has been the custom for many years to examine gross and microscopic sections without any clinical notes whatever. After gross and microscopic examinations are completed, he considers the clinical data in order to reach a diagnosis that is compatible with all the facts in the case.

Only when the complete clinical picture is known, can the globe be sectioned in the proper planes to yield the most information. Dr. de Veer said that he believed that many valuable specimens have been ruined because the clinician has not given enough data to the pathologist. The attending physician

should see to it that the proper information accompanies the specimen to the laboratory.

Sudden degeneration of the optic nerve and its clinical implications

Dr. Joseph Igersheimer discussed his experiences with rapid degeneration of the optic nerve, which are not generally mentioned in the textbooks.

The first group of such cases concerns papilledema. Dr. Igersheimer had the opportunity to follow up a large number of papilledema patients before and after decompression operations and also to examine histologically the whole peripheral visual apparatus of many such cases. Among these cases there were many patients who had normal visual functions before the operation which remained after the decompression. Others showed, even before the operation, a certain grayish discoloration of the disc and a slight decrease of the visual functions. Some of these latter patients demonstrated a rapid deterioration of their vision after the decompression. He recalled the case of a young girl who became totally blind a few days after the operation. She died shortly thereafter, and the microscopic examination showed total Marchi-degeneration of the optic nerve in its entire cross section. This should serve as a warning signal for recommending a decompression operation if the optic nerve already shows clinical signs of beginning atrophy.

A second group with sudden decrease of visual functions was demonstrated by a patient who was studied clinically and anatomically. This patient felt absolutely well until he suddenly developed a mist in front of each eye. The borders of the discs were hazy and the vision was beginning to fail. During the next two weeks, the vision decreased rapidly and the disc showed some grayish discoloration. In the retina there were some small hemorrhages with a tiny star figure on one side. The retinal changes could not explain the visual disturbances. The spinal pressure was normal. There was general hypertension and nephrosclerosis. The patient died practically blind four weeks after the beginning of the eye symptoms as a result of cerebral hemorrhage. Anatomically there was a degeneration of all optic-nerve bundles as shown by the Marchi-method. At the distal end of the optic nerve there was an increase of glial cells. Dr. Igersheimer showed by means of slides that both central vessels had normal lumen. There was no definite pathologic process apparent in the smaller vessels. The cause of the sudden degeneration in this case and in similar cases is not clear, but it must lie in the optic nerve itself. Dr. Igersheimer said that it was probably due to a circulatory damage, since the patients all seem to suffer from a general hypertension or severe atherosclerosis.

Tabetic optic atrophy can, in rare instances, also show a very rapid progression. A 25-year-old woman, who came to the clinic with early visual symptoms, was blind in both eyes six weeks later. Recently Bruetsch has also described such an experience. No case of this type has been studied microscopically as yet.

Differential diagnosis of retinoblastoma

Dr. Algernon B. Reese said that the important characteristics of retinoblastoma which are helpful in making a diagnosis are as follows:

1. The color of the tumor.
2. The identification of calcium in the tumor either by ophthalmoscopic examination or by X ray.
3. Globules of tumor tissue in the vitreous.
4. Implantation growths along the anterior surface of the iris or elsewhere in the eye.
5. A normal size eye.

Dr. Reese said that retinoblastoma must be differentiated from the following conditions:

1. Retrolental fibroplasia. In this condition the color of the lesion, the long ciliary processes, the anterior concavity of the lesion, its presence in an eye that is smaller than normal, and the premature birth of the patient are all important features.
2. Metastatic retinitis.
3. Massive retinal fibrosis.
4. Coats's disease.
5. Dictyoma.
6. Astrocytoma.
7. Extensive medullated nerve fibers.

Bernard Kronenberg,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY

May 19, 1947

Dr. William A. Mann, *president*

Clinical program

(Presented by the staffs of Children's Memorial, Michael Reese, and Mount Sinai Hospitals)

Erythema exudativum multiforme

Dr. Martha Rubin Folk presented Mrs. L. K., seen first in consultation at Mount Sinai Hospital on July 25, 1945. Two days before admission, the patient experienced pain in the left shoulder and hip, for which her family physician gave her an injection of a gold preparation for rheumatism. On leaving his office she experienced a feeling of tightness around her mouth and an increase in saliva. Within a few hours an eruption appeared, covering the eyelids, conjunctiva, and most of the skin of the face, the dorsal part of the arms, chest, abdomen, legs, and feet.

History. Past medical history was not significant except for the story of an ulcer on her leg 20 years ago which healed slowly. Serologic tests were positive.

Physical examination showed an extensive eruption of macular, papular, and vesicle lesions scattered over the entire body with a predilection for the extremities. Many of the lesions had crusts of a violescent hue, and some coalesced into large erythematous patches. A profuse muco-frothy discharge was present on the lips. The buccal mucous membrane, bladder, and rectum were ulcerated. Blood pressure was 217/110. The heart was slightly enlarged. The Kahn test gave a positive result. The blood count was within normal limits. The urine showed a trace of albumin.

Eye findings. Vision was: R.E., 0.8; L.E., 5/200. The skin of the eyelids showed many crusts of various sizes, some of which oozed serum. The lids were adherent; a profuse mucopurulent discharge was visible between the palpebral fissures, which were narrowed to 2 mm. in size. After careful cleansing of the lids, pontocaine (1 percent) was instilled and some adhesions were broken so that the fundi might be examined. Many fine ulcerations were present on the palpebral conjunctiva, which was moderately injected. The cornea was clear but the fundi could not be satisfactorily examined.

Under hospital treatment for three weeks, the lesions of the skin cleared, leaving dark, pigmented patches. The palpebral fissures became larger, but some bands of adhesions near the canthus remained.

At this time there is still a scanty mucoid discharge present from the conjunctival sac. The patient has been receiving antisyphilitic treatment. Cultures and smears show many dead epithelial cells and a few Staph. aureus. No fungi were found. The obliteration of the conjunctival fornices persisted. On several occasions the cornea, stained with fluorescein, showed many punctate ulcerations. On slitlamp examination, both lenses showed grayish opacities and golden brown posterior cortical opacities. The right disc showed a temporal pallor. In the left macular

region, there was a pigmented patch the size of the disc, with others smaller in size. There were various changes in the blood vessels, some tortuosity and nicking of the veins by the arteries at the crossing.

Diagnosis. (1) Erythema exudativum multiforme, which caused scarring of the conjunctiva. (2) Bilateral incipient cataract. (3) Right partial optic atrophy. (4) Left central choroiditis—syphilitic. (5) Hypertensive retinopathy.

This patient is still under weekly observation.

SCIENTIFIC PROGRAM

1. Testing School Children with Massachusetts Vision Tests.—Mrs. B. H. Gray*

2. Toxoplasmosis.—A. C. Krause.

3. The Sodium Vapor Lamp and its Use for Refraction. (See Am. J. Ophth., **30**: 1527 (Dec.) 1947).—Stefan Van Wien.

4. Streptomycin Therapy in Ocular Infections. (See Am. J. Ophth., **30**: 1215 (Oct.) 1947).—John G. Bellows, and Chester J. Farmer.*

Richard C. Gamble,
Secretary.

* By invitation.

HISTORICAL MINIATURES

Toward the end of the middle ages one finds extensive efforts to elaborate a system of optics. The names of Alhazen (965-1038), Roger Bacon (1214-1291), and John Peckham (1240-1294) are well known. The work of Vitellio (1220-1280) is less well known, although he was highly appreciated in his time and during the Renaissance. Leonardo da Vinci thoroughly studied his book, Frederic Risner praised it extravagantly and Johannes Kepler, in 1604, entitled his treatise on optics: *Ad Vitellonem Paralipomens.*

The blackness of the pupil was so much taken for granted that the importance of Mery's demonstration of the visibility of the eyeground in an excised eye that is immersed in water was not recognized. In his student days Adolf Kussmaul not only recognized the importance of the problem of the blackness of the pupil but correctly formulated its details, although it remained for the genius of Helmholtz to provide the solution.

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RETROLENTAL FIBROPLASIA

In infants, and especially in those that are premature, blindness due to the presence of opaque tissue in the vitreous is assuming tremendous importance. The condition does not seem to be a new one, but merely represents an increased incidence of a lesion which has always appeared sporadically and has been called by various names. Terry, who coined the term "retrolental fibroplasia" to designate the lesion, gave great impetus to its study. He appreciated the lately increased incidence and was the first to concern himself regarding it.

At The Institute of Ophthalmology, New York City, we have seen 136 cases, and 89 of these have been seen in the past three years. At the Massachusetts Eye and Ear Infirmary, 165 blind preschool children are recorded as residing in Massachusetts, and in 108 of these the blindness is due to retrolental fibroplasia.

As the high incidence of the disease has occurred only in the past 10 or more years, and as the disease prior to this period was extremely rare, ophthalmologists over the country have not all incorporated the diagnosis in their repertoire. It is difficult, there-

fore, to arrive at a true estimate of the lesion's incidence because all statistics must be based on eye reports from ophthalmologists. The United States Public Health Service has no statistics on the subject. This is also true of many state and local organizations concerned with health statistics.

Figures on the incidence of the disease are available in five states. The reports from four of these states are as of April, 1947, ("The Blind Preschool Child," New York, American Foundation for the Blind, Inc., 1947, pp. 46-51).

The Division for the Blind, Department of Public Welfare, Chicago, Illinois, reported a total of 109 blind preschool children known in the state, and remarked "a more adequate coverage of the state would, we feel, reveal considerably more cases." Out of this total of 109, eye reports were available for only 48. Of these 48, 20 gave retrolental fibroplasia as the cause of blindness.

The New Jersey State Commission for the Blind reported 96 blind preschool children all of whom were covered by eye reports, and 28 of that number gave retrolental fibroplasia as the cause of blindness. Since this report, the New Jersey State Commission has listed a total of 135 cases under their supervision. This rise, within the last nine months, may be real, apparent, or both.

The New York State Commission for the Blind reported 115 cases, of which 93 were covered by eye reports; 20 of them are cases of retrolental fibroplasia.

The Wisconsin School for the Visually Handicapped reported that 58 visually handicapped preschool children were known to the field service of the Department of Public Instruction, and added "information included on causes of blindness is not too reliable as less than 40 percent of the cases are based on direct medical reports." Eight of the 58 cases had retrolental fibroplasia.

The Division of the Blind, Department of Education of the Commonwealth of Massachusetts, reports as of January 1, 1948, that 148 preschool blind children are recorded and that 82 of these have a diagnosis of retrolental fibroplasia.

The figures quoted from The Institute of Ophthalmology, New York City, and from the Massachusetts Eye and Ear Infirmary are not representative: they give too high an incidence of retrolental fibroplasia because both these institutions have manifested particular interest in the disease. On the other hand, the figures available from the four states show too low an incidence of retrolental fibroplasia, because all the ophthalmologists, upon whose certificate the statistics depend, are not diagnosing this condition which has only recently assumed importance. Eye reports covering a larger number of preschool children and better case-finding methods of the organizations interested in the blind would lead to the discovery of many more blind preschool children. Available statistics show that retrolental fibroplasia is by far the commonest cause of preschool blindness. I feel that a fair estimate is that one third of all preschool blindness now is due to retrolental fibroplasia. Furthermore, there are indications that the incidence not only has increased in the past decade or more, but has shown a particular increase in the last few years.

An important factor in this increased incidence is the decrease in mortality of premature infants. The pediatricians now are saving premature babies that formerly were lost. This may not, however, be the sole factor.

There is evidence indicating that the disease may result from an infection of some nature. In support of this it can be said that the incidence of the disease seems to vary in different localities. In one Boston hospital the incidence of retrolental fibroplasia has been found to average 18 percent of all premature births during the past eight years (King, M. J., The Blind Preschool

Child, 1947, pp. 138-142), while in some other localities, the incidence seems lower. My colleagues in other countries, including France, Austria, and Australia, tell me that they do not encounter the condition except as a rare sporadic case. Furthermore, in the fundi of these patients there are clinical manifestations over the areas accessible to examination which indicate that a choroiditis of a mild nature has existed. This manifests itself as a diffuse, mild, pigment disturbance. Also, some of the eyes having retrolental fibroplasia show evidence of an iridocyclitis. This manifests itself as posterior synechiae, atrophy of the iris, and the sequela of exudate around the pupillary margin of the iris. Moreover, from 40 to 60 percent of the mothers of these patients give a history of vaginal bleeding during pregnancy, and some give evidence of having had infection of some kind during their pregnancies. This may be a history of fever or of intercurrent infection such as brucellosis, German measles, ulcerative colitis, and so forth.

It is known that certain mild clinical, or even subclinical, infections of the mother affect the offspring. Toxoplasmosis is a subclinical infection of the mother which produces in the offspring chorioretinitis as well as congenital anomalies. Measles, and perhaps other virus diseases of the mother, can produce abnormalities in the offspring. There must be still other clinical and subclinical infections of the mother acting in similar fashion. In retrolental fibroplasia, therefore, it seems reasonable to postulate that a maternal infection of some nature is responsible for the variations in the incidence in different localities, for the vaginal bleeding and consequent premature birth, and for the signs of inflammation in the eyes of the offspring such as chorioretinitis and iridocyclitis. As pediatricians now save premature infants which would previously have been lost, the sequelae of this maternal infection on the infant now manifests itself as an increased incidence of this lesion which formerly appeared only sporadically. The increased incidence might also be attributed in part at least to an increase in the prevalence of some maternal infection.

The problem of retrolental fibroplasia is the most acute one in ophthalmology today. Is there not some way we can prevent the birth of so many blind infants whose parents, too frequently young and of modest means, can ill afford to have their resources decimated and to carry the tremendous burden of such a child? Often the affected child is the first one of young parents who, though they accept their plight, are terribly handicapped and plan to have no more children. Those concerned in this problem, including the ophthalmologist and the various public organizations and institutions, are not sufficiently aroused to, or conscious of, the importance of the problem. One of the first steps toward clarifying the issue should be a thorough and accurate accounting of premature children with regard to the incidence of retrolental fibroplasia, mental retardation, and other abnormalities. Then it can be decided whether or not the saving of premature infants should be entered on the credit or debit side of medicine.

Algernon B. Reese.

THE WILMER RESIDENTS ASSOCIATION MEETING

The seventh annual meeting of the Wilmer Residents Association was held at the Wilmer Ophthalmological Institute, Johns Hopkins Hospital and University, on April 14, 15, and 16, 1948. The total registration, including guests, was 181. Those privileged to attend came from many places in the United States.

The Residents Association is composed of former residents of the Wilmer Ophthalmological Institute. The purpose of their annual clinical meeting is to provide an opportunity for the returning residents, former house officers, assistant residents, and guests

to review the work done in the Wilmer Institute during the past year, and to follow the activities of the former residents. It has been the custom to invite a number of ophthalmologists from other cities to attend these meetings.

There were 26 papers or presentations by former residents, past and present members of the staff, and from members of other departments of the university. Thus, a most impressive array of authors and subjects was paraded before the keenly interested audience during the three delightful days of the meeting.

The quality of the work and its importance to ophthalmology was most striking. It is impossible here to do adequate justice or to describe in detail the individual contributions. Many of them will appear in subsequent issues of the JOURNAL. However, the papers by Woods on "Antibiotic and Chemotherapy in Experimental Ocular Tuberculosis," Owens and Owens, on "Retrolental Fibroplasia," Walsh on "Nasopharyngeal Carcinoma," Woods and Wood on "Bacterial Hypersensitivity and Its Relation to Ocular Disease," and Kuffler on "Synaptic Transmission with Reference to the Retina," were particularly worthy of note.

Dr. Alfred Blalock discussed the "Surgical Treatment of Coarctation of the Aorta and Pulmonic Stenosis," and showed a breath-taking motion picture in Kodachrome of his spectacular and life-saving operation in these conditions. Dr. Jonas Friedenwald brilliantly presented some of his recent work on "Enzymatic Histochemistry and Its Applications to Ophthalmic Research," and did his best to simplify the complexities of the subject for his overwhelmed listeners. Dr. William G. Marr debunked and devastated the cyclodiathermy operation for glaucoma. Dr. Samuel D. McPherson, Jr., and Dr. Ronald Wood exhibited convincing evidence that solutions of the usual drugs used in ophthalmology in 1:5,000 Zephiran remain sterile for weeks thereafter. Dr. M. Elliott Randolph read an excellent paper on "Recurrent Erosion of the Cornea," and suggested the value of histamine desensitization for this stubborn condition. The paper by Bruno and McPherson, Jr., on "Harada's Disease," was thought-provoking and stimulating. These and the other papers on the program showed careful observation, work, and skill in presentation. One cannot praise the meeting too highly.

There were many lighter moments and times for relaxation and entertainment during the evenings. A skit, ably performed by the active house officers and residents, poked harmless fun at their betters (in age at any rate) and slyly probed into the foibles and dignities of their directors. The actors' lines were clever and were relished by the onlookers, particularly those who were not in the line of fire. Derrick Vail.

CORRESPONDENCE

REPLY TO DR. CRISP

Editor,
American Journal of Ophthalmology:

In the March issue of the *American Journal of Ophthalmology,* there appears an editorial signed by Dr. W. H. Crisp, in which decided exception is taken to certain portions of an address delivered by me in Chicago at the recent meeting of the American Academy of Ophthalmology and Otolaryngology.

Dr. Crisp elected to express his disapproval through the medium of an editorial rather than take the more conventional method of a letter to the editor. In adopting this more formal and official approach he avails himself of his position as consulting editor of the *Journal* and in his use of the pronoun "us" implies general editorial approval. Thus his criticism immediately passes the boundary of personal disagreement and assumes the tenor of an official rebuke. Inasmuch as I have a natural reluctance to endure chastisement meekly, and am moreover quite unrepentant, may I take this opportunity to point out certain points

in Dr. Crisp's presentation where his argument appears to me difficult to follow?

In the address delivered in Chicago I endeavored to give full recognition to the solid accomplishments of the American Board of Ophthalmology and to the high character of their aims and purpose. Four adverse criticisms were offered, all of which I believe to be constructive and calculated to provide better internes, stimulate investigation, and to advance ophthalmology as a whole. These four criticisms concerned, first, the required year of general interneship; second, the so-called basic-science requirements; third, the principle of hospitals and institutions requiring certification of a specialty board as a prerequisite to appointment and promotion; and lastly, a question of the policies of the national ophthalmologic societies, wherein the certificate of the specialty boards is a prerequisite for membership. Dr. Crisp states that these criticisms might, if taken seriously, endanger the whole fabric of the Board's endeavor. I cannot agree that the Board's fabric of endeavor is so thin and tenuous that it is unable to stand constructive criticism. I considered the Boards established in a much more solid basis, and frankly said so in my address.

Dr. Crisp takes exception to three of the above criticisms. The first of these relates to the requirement by the Board of a preliminary year's interneship in a general hospital. This he admits is a debatable question. In essence he defends this requirement with a statement, that considering all phases, the rule is more frequently wise than foolish, that a waste of time is more or less unavoidable, that this is exemplified by the activities of student nurses, and indeed he suggests that my own internes in The Johns Hopkins Hospital are guilty of the same practice. Quite probably Dr. Crisp is correct in this accusation, but is this any argument in favor of waste of time? Dr. Crisp further asks if an understanding of the relation of ophthalmology to general medicine is not desirable. Obviously, everyone must answer this question in the affirmative. This, however, is not the point. The pertinent question is who shall initiate the instruction of the future ophthalmologist in this relation—an internist, a surgeon, a gynecologist, an obstetrician who knows little or nothing of ophthalmology, or a competent ophthalmologist who has spent his life in the study of the question? If the ophthalmologic service can provide this instruction, as any well-organized service should be able to do, I believe they should be entrusted with the task. In his concluding sentence Dr. Crisp states the duty of the American Board is to satisfy the clinical needs of the general community. On this point at least we see eye-to-eye. I expressed it slightly differently in saying that the Board is nothing more or less than an agency to determine the clinical fitness of practitioners of ophthalmology.

Dr. Crisp's next criticism involves the principle that hospitals should make Board Certification a requisite for appointment and promotion. Dr. Crisp states that my condemnation of this principle is extended to include the action of the Veterans Administration in requiring that persons appointed to its attending and consulting staffs be diplomates of the Boards representing their specialties and also in granting a 25-percent increase in salary to members of the full-time staff who obtain certification. In stating that I condemned this practice, Dr. Crisp makes an unwarranted assumption. In my address, I cited this action of the Veterans Administration as a contribution to the power, strength, and prestige of the Boards and as an example that Board certification might well mean actual dollars in the pockets of the diplomates. In no place in my address did I condemn this action of the Veterans Administration. Further on in Dr. Crisp's editorial, returning to the same subject, he refers to the action of the Medical Board of The Johns Hopkins Hospital in which that body refused to accede to the principle that certification by any specialty board be a condition of appointment or promotion

to any position on the staff of The Johns Hopkins Hospital, and their subsequent circulations of this resolution. This action Dr. Crisp characterizes as a "rather unpleasant slap at standardization." It is peculiar, however, that in his discussion and criticism Dr. Crisp does not similarly indict the Council of Medical Education and Hospitals and the House of Delegates of the American Medical Association, who somewhat belatedly have expressed similar views and have now taken official action condemning this practice.

For some peculiar reason Dr. Crisp appears somewhat puzzled that I did not adversely criticize the American Board of Otolaryngology, whose certificate Dr. Crisp states is "usually rather easier of attainment." I confess this did not occur to me, nor is it altogether clear even now why I should assail the Board of another specialty, about which I know nothing. The dual membership of the Academy and the relative severity of the two Boards were not subjects of my address.

Dr. Crisp next accuses me of an exaggerated fear that the application of the principle, presumably of the requirement of certification for appointment, will endanger the research institutions. I assure Dr. Crisp I have no such fear. Fortunately, the research institutions of the country are, far and large, under the control of intelligent men. In my address I merely speculated on what would be the effect did institutions accept such a stifling stricture.

Dr. Crisp's concluding charge concerns my opinion of the present policies of the national societies in which Board certification is made a prerequisite for membership. Here I stated, "If I am correct in my idea of the lines along which ophthalmology must henceforth develop, the present policies of the national societies lie squarely across this pathway." Here Dr. Crisp accuses me of exaggeration. He presents no arguments controverting my views on the future development of ophthalmology, although here there is obviously ground for differences of opinion, and it is quite probable Dr. Crisp and I may hold radically different views. Dr. Crisp contends that the national societies already fully comply with my "desideratum," and that no scientist can be regarded as an ophthalmologist unless he possesses the knowledge of clinical ophthalmology demanded by the American Board. On these conclusions, I am in complete disagreement with Dr. Crisp. I am prepared to admit that our concepts of the future development of ophthalmology, and our definitions of an ophthalmologist, may be so different there is no probable meeting of minds. I fail, however, to see where fundamentally different concepts of a problem justify the charge of exaggeration.

(Signed) Alan C. Woods,
Baltimore, Maryland.

An answer to Dr. Woods

Editor,
American Journal of Ophthalmology:

I am glad to have an opportunity to glance through Dr. Wood's comments. Incidentally I notice that, because I once used the word "us" in referring to my colleagues in ophthalmology, Dr. Woods assumes that I am indulging in the editorial "we" and therefore imply general editorial approval. Dr. Woods should know by this time that the policy of the *American Journal of Ophthalmology* has been to encourage each editorial writer to express his own individual opinions. As to Dr. Wood's lightly expressed suggestion that I was availing myself of editorial privilege, the editorial writer is surely no more privileged than an Academy president whose presidential address is not open to discussion.

In a general way I believe I correctly interpreted the tenor of Dr. Wood's remarks concerning the American Board of Ophthalmology. I may have gone astray a little as to his attitude with regard to the Veterans Administration and its beneficial recognition

of those having certificates from the Boards. The atmosphere created by the context led me to assume that this was among the disapproved activities of the Boards. I have met others who received the same impression.

Dr. Woods is certainly mistaken in supposing that I was accusing his internes of wasting time. Mere inspection of my question (Am. J. Ophth., 31:348 (Mar.) 1948—first paragraph, column 2) will indicate that I referred to systems rather than to persons. Oft-repeated performance of routine duties inevitably involves waste of time so far as the education of the individual is concerned.

My remarks about the certificate of the American Academy did not criticize the Board of Otolaryngology but suggested a certain result in regard to the Academy's certificate of membership.

I am content to have my editorial read in conjunction with the presidential address itself and with Dr. Wood's present letter. My purpose was not to find fault but to analyze the situation.

(Signed) William H. Crisp,
Denver, Colorado.

The serology of trachoma

Editor,
American Journal of Ophthalmology:

In 1944, I made serologic investigations upon trachoma patients. The number of these investigations was small, but in the following years I did not have an opportunity to go on with the work. I am, therefore, reporting the results already obtained in the hope that someone will be interested in continuing these studies.

I shall explain briefly what has already been done and what I intended to do. The supposition is not an entirely new one. For some time the connection between trachoma and the lymphatic apparatus has been well known (Angelucci, Kuhnt, and so forth). In my opinion, trachoma does not rank as an independent disease of the lymphatic system, but is rather only a symptom of one general lymphatic disease.

Both microscopically and clinically, trachoma resembles other diseases of the lymphatic system. The vascular picture in the conjunctiva is frequently strikingly similar to that in lymphatic leukemia. True acute trachoma is very like the "drüsenfieber" of Pfeiffer.

TABLE 1
Results of the Paul-Bunnel test in 32 cases of known trachoma

No. of Patients	Reading	Percent
8	1:112	25
4	1:224	12.5
5	1:28	15
1	1:448	3
12	1:56	37.5
2	1:896	6

* It is generally stated and accepted that a reading up to 1:56 is normal; over 1:56 is positive.

TABLE 2
Results of the Paul-Bunnel test in 11 cases known to be free from trachoma

No. of Patients	Reading	Percent
1	0:00	9
1	1:14	9
4	1:28	36
5	1:56	46

With these thoughts in mind, the Paul-Bunnel test was made in 32 cases of trachoma. As controls, the same serologic tests were made of 11 cases in which no trachoma was present but in which the following eye diseases had been diagnosed—3, serpent ulcers; 1, acute glaucoma; 1, keratoconjunctivitis sicca; 1, keratitis lymphatica; 1, wound from BB-shot; 2, marginal ulcers; 1, hematoma of the lids; 1, interstitial keratitis. The results are given in Tables 1 and 2.

Since many of my patients were young soldiers, some of them may have been artificially infected with trachoma. It was intended, therefore, as the next step to make serologic examinations of numerous patients with trachomatous pannus, as well as

of patients in whom trachoma had been positively diagnosed (MacCallan).

It was further intended to do a number of animal experiments, using the Paul-Bunnel reaction. Someone who reads this may be interested in developing these ideas.

(Signed) Janos Majoros, M.D.,
VIII. Brody Sandor-u. 6.,
Budapest, Hungary.

LUMINOUS CROSS FOR FIXATION

Editor,
American Journal of Ophthalmology:

I have not seen the following idea published, yet it has proved valuable in my practice. It is difficult to do a fundus examination on old persons with small pupils, who cannot fix the eyes on an object. With nothing to fixate on, they continue to move their eyes.

I bought a small bottle of luminous paint and a brush, then painted two pieces of adhesive tape. On the wall directly in front of a chair in the dark room, I pasted these two pieces of tape in the shape of a cross. The cross was then covered with Scotch tape to hold it in better position and to keep the surface clean.

(Signed) Sydney S. Deutch,
Fall River, Massachusetts.

BOOK REVIEWS

TABULAE BIOLOGICAE. Volume XXII (Oculus). Pars I. Uitfeverij, Dr. W. Junk, Amsterdam, 1947.

Of this monumental collection of biologic data, a volume of 408 pages, the first part of four on the eye, has appeared. It is fittingly prefaced by an appreciation of the work and enthusiasm of Kurt Steindorf, without which this great undertaking could never have been launched. Three other parts are in preparation in which data on vegetative physiology and physiologic optics will be presented. Like its predecessors the book is intended for reference, and, as a repository of every imaginable fact that can be expressed in numbers, it could not be surpassed.

This volume presents in tabular form all available data arranged in several chapters each of which has a most extensive list of references. In the first chapter, Hermann Kahmann deals with the eyes of invertebrate animals. Fifty pages of tables record such facts as the number and position of eyes, size and position of various ocular structures, and extent of visual fields of innumerable species of animals. The second chapter of more than a hundred pages by Stefanie Oppenheimer deals with metric and descriptive characteristics of the human and animal eye. The section which deals with the measurement of the bony orbit of primates is accompanied by 54 figures on 11 plates. The other part of the chapter deals with the lids and most extensively with the color of iris in relation to race, heredity, age, and pigmentation of hair.

In the third brief chapter Dejean and Granel describe the eye of the vertebrate embryo; 12 pages suffice for this. The fourth chapter by Steindorff presents the descriptive anatomy of the eye of vertebrates and man in 126 pages of tabulation and an extensive bibliography. In the remaining pages Nordmann discusses the anatomy and physiology of the pupil in vertebrates, and Ascher discusses the intraocular pressure and intravascular pressure in the eyes.

The index also lists those contributions in Volumes I to XXI of Tabulae Biologicae which refer to the eye.

F. H. Haessler.

AN INTRODUCTION TO THE PRESCRIBING AND FITTING OF CONTACT LENSES. By Dickinson and Hall. London, England. Hammond and Hammond and Co. Ltd., 1946. 168 pages. Index and 97 illustrations, Price, one guinea.

This publication, the first to be written in England on the subject of contact lenses, contains general information on the methods of fitting of molded and ground contact lenses. It contains chapters on the history, optical principles, and sphere of utility of the contact lens. There is a great deal of pertinent material as to the fitting of contact lenses and their usefulness.

While this book may give the ophthalmologist and optician an overall picture of contact lenses, there are many who feel that the techniques more recently evolved permit more rapid and accurate fitting than those described in this book. The chapter on the sphere of utility needs more strict scientific direction.

Francis W. Parker.

BULLETINS ET MEMOIRES DE LA SOCIÉTÉ FRANÇAISE D'OPHTHALMOLOGIE Published by the Members of the Board. Volume 59, 1940-1946.

This volume contains the membership lists of the Société Française d'Ophthalmologie, the transactions of the scientific sessions, and the minutes of the meetings from May 20, 1946, to May 23, 1946.

The first part contains the discussions about G. Renard's new ophthalmoscopic atlas and seven lectures about various fundus diseases. A. Fritz's paper, concerning the relation diameter of retinal veins and arteries has to retinal metabolism is one of the most interesting. So is Mme. S. Schiff-Wertheimer's and Mlle. G. Gaillard's study of the intravenous use of novocaine in thrombosis of the retinal veins. The authors use 1-percent novocaine solution of which as much as 10 cc. is injected very slowly. Improvement should be noticeable on the same day. If it is not, the injection should be repeated, at first daily, later two or three times per week, until 10 injections have been given. The prognosis of branch thrombosis is most favorable with this treatment.

The second part includes 16 lectures on corneal and conjunctival diseases and their treatment and it brings many interesting details, especially the symposium on corneal surgery. P. Sourdille's paper on complete keratoplasty, M. Franceschetti's study on the technique of this operation, and L. Paufique's comparison between complete and incomplete keratoplasty are valuable contributions.

The third and fourth parts record papers on varied topics. The biochemistry of the lens, the familial incidence of glaucoma, the symptomatic and surgical treatment of glaucoma were described at length. Special emphasis should be given to Kalt's lecture on iridencleisis, Coppez's lecture on microdiathermy puncture with the pyrometric electrode, Szymanovky's lecture on demi-Elliot, and Mme. Schiff-Wertheimer's symposium on the complications of diathermy coagulation in retinal detachment. Drouet, Thomas, Herbenvol, and Henry reported on five cases of recurrent vitreous hemorrhage which were caused by intestinal parasites (ascarides). A cutaneous reaction was helpful in the diagnosis. Verrey's study on the cytology and bacteriology of the aqueous may elucidate the etiology of uveitis and the detection of latent focal infections.

The etiology of uveitis was widely discussed. J. Babel discussed benign ocular leptospiroses. R. Nertoux and R. Chercheque reported their investigation of blood cultures from the gums in uveitis associated with alveolar pyorrhea. Amsler described, once more, his experiments on a blood-aqueous barrier, using the same equipment and technique as in earlier work described in Ophthalmologica 111:155, 1946. A. Franceschetti and V. Bischler analyzed the pharmacodynamics of Adie's syndrome. C. E. Joyle and A. G. Ourgand discussed retinal adaptation.

Alice R. Deutsch.

ABSTRACT DEPARTMENT

EDITED BY DR. F. HERBERT HAESSLER

Abstracts are classified under the divisions listed below. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. Anatomy, embryology, and comparative ophthalmology
2. General pathology, bacteriology, immunology
3. Vegetative physiology, biochemistry, pharmacology, toxicology
4. Physiologic optics, refraction, color vision
5. Diagnosis and therapy
6. Ocular motility
7. Conjuctiva, cornea, sclera
8. Uvea, sympathetic disease, aqueous
9. Glaucoma and ocular tension
10. Crystalline lens
11. Retina and vitreous
12. Optic nerve and chiasm
13. Neuro-ophthalmology
14. Eyeball, orbit, sinuses
15. Eyelids, lacrimal apparatus
16. Tumors
17. Injuries
18. Systemic disease and parasites
19. Congenital deformities, heredity
20. Hygiene, sociology, education, and history

1
ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Deller, J. F. P., O'Conner, A. D., and Sorsby, A. **X-ray diameters of the living eye.** Proc. Roy. Soc., S.B. **134**:456-466, Sept. 30, 1947.

To measure the diameters of the globe the subject undergoes 15 minutes preliminary dark adaptation. He is then seated facing the x-ray apparatus in a darkened room with his head immobilized in a clamp. A slit beam of Roentgen rays 0.5 by 50 mm. is projected so that it traverses the eyeball with the plane of the beam at right angles to the diameter to be measured. This excites the sensation of vision where the beam transects the retina. By moving the beam from side to side without changing its direction with respect to the diameter and questioning the patient as to his visual sensations, it is possible to determine a position where the beam is tangential to the retina, that is, the position where the reported sensation is that of a point of light. This position is marked by an exposure on a film introduced in front of the eye. The beam is then moved until it is again tangential at the opposite pole and its position again marked. On the developed film the distance between the two images gives the length of the diameter; thus any selected diameter can be measured provided its ends abut on the retina. As to the axial length, this is measured by determining the lateral projection of the posterior pole of the eye on a film by the method already described. A true lateral radiograph of the cornea is then taken on a dental film held at the inner canthus. A special cone is used carrying a cross-wire in its central ray, which impresses its image on both films. After development, the films are related to each other by superimposing the images of the cross-wire and the axial length measured between the corneal image and the slit image. Measurements may be regarded as accurate to the extent of ± 0.5 mm., the width of the slit.

A series of tables is presented. One displays the findings in 45 eyes of which routine clinical examination of refraction was combined with the measurement of the three diameters of the eye. A second shows the relation of diameters to each other and deviation from spherical shape in relation to refractive state; a third shows the volume of globe calculated on the assumption that the eye is ellipsoidal

(ratios of log. of volume/log. of the individual diameters). A fourth shows the volume in a series of eyes measured by L. Weiss (1897), assessed against the present series, the validity of the assumption as to calculated ellipsoid volume, and the application of the formula of ratio of log. of volume to log. of axial length. The fifth shows the relation of the computed total refraction to the axial length.

Theodore M. Shapira.

Wolff, Eugene. **A note on the attachments and action of the ciliary muscle.** Tr. Ophth. Soc. U. Kingdom **65**:164-169, 1945.

The author attempts to describe the relationships of the origin of the ciliary muscle, the scleral spur and the ligamentum pectinatum. They all develop from a continuous mass of mesodermal cells in the neighborhood of the future angle of the anterior chamber. In the adult the tendinous fibers of the ciliary muscle arise partly from the scleral spur and from the ligamentum pectinatum. The percentage of origin from each structure seems to vary in different eyes and in different portions of the same eyes. In many cases the fibers of the ligamentum pectinatum pass outwards to give a tendinous attachment to some of the circular fibers and also to some of the radial fibers of the muscle, which form a tendinous ring.

The most posterior muscle fibers give place to the delicate muscle stars of Salzmann and are attached to fine elastic fibers continuous with the lamella of the suprachoroid. These posterior attachments of the ciliary muscle, consisting largely of delicate elastic tissue, seem to be adapted to allow the posterior ends of the muscle to pass forwards during contraction and to guide them back to their original positions on relaxation. Because of this, the action of the ciliary muscle causes as little disturbance to the choroid as possible. The ciliary muscle has no attachments to the ciliary processes, therefore, it is difficult to explain how it can draw the ciliary processes forward as is often stated. The forward movement of the ciliary processes would tighten those fibers which pass backwards to the posterior capsule of the lens and relax the anterior fibers of the zonule. The entire muscle gets thicker with contraction and this increases the cross-sectional diameter and may act as a sphincter to the ciliary ring. (5 figures.) Beulah Cushman.

2

GENERAL PATHOLOGY, BACTERIOLOGY, IMMUNOLOGY

Knisely, M. H., Bloch, E. H., Eliot, T. S., and Warner, L. **Sludged blood.** Science **106**:431-440, Nov., 1947.

An outline and summary of 16 years of observation and experimentation is presented. The circulation of blood in the vessels of the internal organs of living anesthetized animals—amphibians, reptiles, birds and mammals—and in the bulbar conjunctiva of unanesthetized animals and man was observed. In 600 patients who had a wide variety of diseases the blood was changed from the normal, relatively fluid, state to a circulating sludge. This observation is not offered only as a criterion for the diagnosis of disease. Sludged blood does not traverse the smaller vessels and it is believed that this change in character is one of the fundamental processes of pathologic physiology that produces tissue damage fundamental to many diseases.

The observations on the conjunctiva were made with the corneal microscope familiar to the ophthalmologist. (1 figure, 53 references.) F. H. Haessler.

Mann, Ida. **Induction of an experimental tumor of the lens.** Brit. J. Ophth. **31**:676-685, **Nov., 1947.**

Pathologists state that any tissue capable of cell division is capable of develop-

ing cancer yet neoplasms of the lens are unknown to ophthalmologists. Although mitoses occur in the subcapsular epithelium throughout life. It is not likely that the lens tissue is simply inherently resistant to malignant change or that the capsule inhibits new growth either by the tension it exerts or by its properties as a semipermeable membrane, preventing access of the required stimulus to the lens cells. This is not likely since lenses with ruptured capsules do not become malignant. A third possibility is that the lens owes its immunity to its lack of blood supply.

Pathologic techniques for the induction of experimental cancer include the use of a chemical carcinogenic agent such as methylcholanthrene, and the investigation of inbred laboratory animals. The first experiment consisted of the injection of the chemicals into the lens in situ of rabbits followed by repeated slit lamp examinations. No reactions whatever occurred for 10 months. The second experiment involved the transplantation of the lens to a new position where it could receive an ample blood supply. Mice were used and the chemically treated lenses, with capsule ruptured were implanted in the flank. Thirty-eight experiments were done and 26 tumors resulted; of these, three were cancers of subcapsular epithelium. These were highly malignant, true carcinomas and were reproduced exactly by transplantations. These tumors were chemically identical with lens substance and there was no doubt that they arose from the subcapsular epithelium of the lens. Thus lens epithelium is capable of becoming malignant and its poor blood supply is most probably a factor in its immunity. (9 photographs.)

Morris Kaplan.

Smelser, G. K., and Pfeiffer, R. L. **Influence of grenz rays on cell division and wound healing in the corneal epithelium.** Arch. Ophth. **39**:1-8, Jan., 1948.

The eye is subjected to many forms of radiation for the purpose of treatment or diagnosis. Among these are the grenz rays, which have been used extensively for the past fifteen years. They are soft rays of 1 to 4 angstrom units, intermediate between the ultraviolet and the usual roentgen rays, and have some biologic properties in common with both. Grenz rays have been found of value in the treatment of superficial ophthalmic conditions, such as corneal ulcer or episcleritis.

The authors treated normal rats' eyes and eyes that were burned with the thermophore. Single exposure to grenz rays (410r) greatly inhibited cell division in the corneal epithelium for approximately five days. Grenz rays had no effect on the rate of epithelization of thermal burns made within six days of the irradiation. Thermal burns made eight days after a single irradiation healed more slowly than normal in 12 of the 13 animals studied. (2 figures, 11 references.)

R. W. Danielson.

3

VEGETATIVE PHYSIOLOGY, BIOCHEMISTRY, PHARMACOLOGY, TOXICOLOGY

Bliss, A. F. **Mechanism of retinal vitamin A formation.** J. Biol. Chem. **172**:165-178, Jan., 1948.

The visual pigments needed for the experiments were obtained from the retinas of the common frog. It was found that fresh bleached solutions of the photosensitive pigment rhodopsin formed large quantities of vitamin A and that this vitamin formation was probably induced by a substance having the characteristics of an enzyme.

Francis M. Crage.

Dellaporta, A. **A case of transitory myopia after prontosil.** Proc. Ophth. Soc. Vienna p. 11, April 27, 1942.

A transitory myopia after prontosil therapy was favorably influenced by the local application of homatropin which indicates that in such cases the ciliary muscle is affected by the sulfa drug.

F. Nelson.

Euler, P. **Blindness through wood alcohol and its treatment, particularly with short wave diathermy.** Klin. Monatsbl. f. Augenh. **112**:172-182, 1947.

In 20 cases of wood alcohol poisoning hot packs, subconjunctival and retrobulbar salt injections, retrobulbar injection of atropine and shortwave treatment of the eyes were given to produce hyperemia with increase in local metabolism. Short wave treatment proved beneficial in 90 percent of the patients who were subjected to it. (Bibliography.)

Max Hirschfelder.

Feigenbaum, A. and Kornblueth, W. **Human conjunctiva grafted on the chorioallantois of chick embryos.** Arch. Ophth. **39**:67-79, Jan., 1948.

The experiments reported here show that it is possible to maintain human conjunctiva in fairly healthy condition outside the body by grafting conjunctival fragments onto the chorioallantoic membrane of developing chick embryos. The chief obstacle to be overcome in these experiments is native infection of the conjunctiva, which can be controlled only to a certain extent with the use of penicillin. The method presented seems to offer possibilities of a systematic study, under conditions excluding somatic factors, of the histogenesis of pathologic changes of the conjunctiva in various diseases, especially those caused by viruses. (7 figures, 3 references.)

R. W. Danielson.

Grignolo, Antonio. **The action of streptomycin on experimental infection of the eye produced by organism sensitive to streptomycin.** Boll. de la Soc. med.-chirurg. di Pavia, nos. 3 and 4, 1947.

Infection of the cornea and anterior chamber were produced in rabbits by the following organisms: Escherichia coli, Proteus vulgaris, Klegsiella pneumoniae (Friedlanderi), Pseudomanas aeruginosa, B. subtilis, Staphylococcus aureus. Identical inoculations were produced in both eyes. In most cases one eye was used as a control and the other was treated. Streptomycin ointments and irrigations were used in the corneal infections and subconjunctival and anterior chamber injections were used in the chamber infections.

Infections of the cornea produced by E. coli, B. proteus, B. Friedlanderi, B. subtilis and S. aureus treated within 12 hours responded to treatment. After 24-48 hours streptomycin was ineffective. Infections with B. pyocyaneous were not altered at any time. Ointments were found to be superior to irrigations. Infections of the anterior chamber by E. Coli and B. pyocyaneous were more resistant to treatment than the corneal infections. Injections of streptomycin into the anterior chamber two hours after inoculation arrested infection with E. coli but were ineffective in the pyocyaneous group. Injections after 12 hours were of little value. Subconjunctival injections produced no changes at all.

Experiments in vivo and in vitro have shown that there is no interference between the action of penicillin and that of streptomycin. The ointment contained 100,000 gamma per gram and was applied every three hours day and night. The solutions contained 100,000 gamma per cc. for irrigations and subconjunctival injections. A total of 50 gamma was injected into the anterior chamber.

Francis P. Guida.

Layton, A., Morgan, M. W., Jr., and Olmsted, J. M. D. **Refractive changes pro-**

duced by injection of fluids into the vitreous humor. Am. J. Physiol. **150**:568-571, Oct., 1947.

Diets rich in galactose and intravenous injections of galactose have produced cataracts in the rat. The mechanism involved was thought to be an accentuation of the osmotic difference between the lens and aqueous humor resulting from a decreased permeability of the lens capsule.

The high incidence of cataracts and the refractive changes in human diabetics have therefore been attributed to abnormal osmotic pressure relations of the body fluids resulting from a high blood sugar. To ascertain whether local osmotic changes could also cause lens or refractive changes the effects on cats' eyes of intravitreal injections of hypotonic and hypertonic fluids was studied. If more than 0.25 cc. was injected, corneal edema from increased intraocular tension occurred. Similar temporary refractive changes, measured by retinoscopy, resulted after every fluid injection. A change of 1.00 to 3.00 diopters in the direction of hypermetropia was present in each animal injected. No lens clouding was seen. Amyl nitrite inhalations given with the injections inhibited the refractive changes. Adrenalin injections alone produced hypermetropia and the latter was increased when the adrenalin was given at the same time as the vitreous injections.

The cause for the refractive change was considered to be a mechanical one dependent on the blood content of the ciliary body and the consequent increase or decrease in the power of the lens through the action of a relaxed or tonic suspensory ligament. F. M. Crage.

Leopold, I. H., and Steele, W. H. **Penetration of locally applied BAL into the anterior chamber of the rabbit eye.** Arch. Ophth. **38**:192-198, Aug., 1947.

Studies were made on rabbits to determine the penetration of BAL (2,3-dimercaptopropanol) into the aqueous when applied to the cornea. BAL essentially neutralizes the arsenic in burns due to lewisite (2-chlorobetachlolorinylarsine).

Aqueous solutions of BAL deteriorate more rapidly than solutions in ethylene glycol and the more dilute the aqueous solutions of BAL the more apparent the loss. Greater penetration into the aqueous humor occurs from the use of a 5-percent solution of BAL in water than from the use of a 5-percent solution of BAL in ethylene glycol. BAL penetrates more readily from a water-containing base, such as K-Y jelly, than it does from a nonaqueous base, such as Friedenwald-Fuqua ointment. John C. Long.

Rosso, Silvio. **A study of purine substances in the aqueous humor.** Ann. di ottal. e clin. ocul. **72**:628-536, Oct., 1946.

By experiments on rabbits and man Rosso finds that the purine content of the aqueous varies more or less directly as the purine content of the blood serum. His researches indicate that inflammatory manifestations of the gouty type may occur in ocular tissues as well as elsewhere whenever conditions are favorable for the precipitation of uric salts, since uric acid is always present in the ocular fluids in varying quantities and is increased in hyperuricemia. Harry K. Messenger.

Schmerl, Ernst, and Steinberg, Bernhard. **The role of the diencephalon in regulating ocular tension.** Am. J. Ophth. **31**:155-158, Feb., 1948. (6 figures, 12 references.)

Sondermann, R. **The physiology and pathology of intraocular pressure.** Klin. Monatsbl. f. Augenh. **112**:113-124, 1947.

Sondermann does not believe that the intraocular pressure is maintained as a result of secretion of aqueous humor. The intraocular pressure is the result of a

damming up of the venous circulation on its way through the sclera and is only modified by the regulatory activities of the ciliary body and the canal of Schlemm. The intraocular pressure is shown to be the difference between the 50 mm. pressure in the vortex veins and the 25-mm. osmotic pressure. The pressure in the veins sinks abruptly after they leave the sclera. With advancing age the sclera becomes still denser, but an increased formation of aqueous and often enlarged Schlemm's canal regulate the intraocular pressure and keep it normal. Only if these emergency mechanisms fail in their regulatory functions because of sclerosis or inflammation will the intraocular pressure establish itself on a level higher than normal. This is the case in chronic simple glaucoma. Acute glaucoma is caused by a sudden exclusion of the regulatory mechanism. It is usually caused through a sudden pushing forward of the iris which blocks the chamber angle and prevents the outflow of aqueous. The pressure in the retinal veins is only about half of that in the vortex veins and is only slightly higher than the intraocular pressure. Almost no outside pressure is exerted on these retinal veins. The ciliary arteries with their thicker walls and more adventitia are also less exposed to outside squeeze and the question of stagnation within their lumen is of less importance. However, a certain amount of choking may exist and may act as an equalizing factor for the variations in the general blood pressure. This is particularly important when there is severe vascular hypertension. The persistence of higher arterial and venous pressures within the scleral channels causes a more even and a more quiet blood circulation within the eyeball. The circulatory stagnation prevents the rapid circulation that is sometimes required in pathologic, especially in inflammatory, conditions. Paracentesis and medication with pilocarpine lessen this stagnation and dilate the vessels which leads to improved circulation.

Max Hirschfelder.

4

PHYSIOLOGIC OPTICS, REFRACTION, COLOR VISION

Ahlenstiel, Heinz. **The entoptic phenomenon of Maxwell's spot in the normal and in the color blind.** Arch. f. Ophth. **148**:162-167, 1947.

The shape of Maxwell's spot (central fovea) is studied entoptically in 127 normal and 94 color blind persons. Numerous forms of the spot are pictured and the conclusion is reached that under certain conditions the color blind notice this phenomenon more easily than the normal person. E. Schmerl.

Ahlenstiel, Heinz. **The red-green luster in the colorblind especially in the dichromates.** Arch. f. Ophth. **148**:168-170, 1947.

The author is a protanope. He and some deuteranopes observed that the borderline between a green and a red area showed a slight luster. Insufficient discrimination between the reflected red and green light of the borderline is offered as an explanation of this phenomenon. E. Schmerl.

Albaugh, C. H. **Contact lenses.** Ann. West Med. and Surg. **1**:369-373, Nov., 1947.

The author reviews the development of contact lenses. The indications for contact lenses are specific and the less the necessity, usually the shorter the wearing time. Many technical problems including the lens fluid remain to be solved. Although contact lenses worn for their cosmetic effect have become economically important this valuable therapeutic agent can often provide useful vision in otherwise hopeless cases. O. H. Ellis.

Brozek, J., Simonson, E., Bushard, W. J., and Peterson, J. H. **Effects of prac-**

tice and the consistency of repeated measurements of accommodation and vergence. Am. J. Ophth. 31:191-198, Feb., 1948. (5 tables, 7 references.)

Campos, Raffaele. **Practical notes for cylinder skiascopy.** Ann. di ottal. e clin. ocul. 72:726-748, Dec., 1946.

This succinct and clear exposition of the practice of cylinder retinoscopy is designed to do for Italian ophthalmologists what others have already done for those whose language is English, German, or French. Harry K. Messenger.

Candela, J. R. **Retinal complications in diabetes mellitus.** Arch. Soc. Oftal. hispano-am. 7:851-857, Sept., 1947.

The mechanism by means of which the retinal lesions in diabetes mellitus are produced is still entirely unknown. Formerly it was believed that the fundus picture found in hypertensive retinopathy was the same as diabetic retinopathy but later studies have proved that they are entirely different. A constant fact in diabetic retinitis is the decrease of the resistance of the capillary wall. Electrophoretic tests were made to determine alterations in the plasma proteins. In adequately treated diabetes mellitus one finds slight reduction of the total proteins with reduced level of albumin and an increased amount of B globulin. It has been proved that high protein diabetic diets are valuable in the prevention and treatment of diabetic retinitis. J. Wesley McKinney.

Carlevaro, Gianfranco. **Importance of the diagnosis of asymmetry or decentration in the prescribing of corrective lenses.** Ann. di ottal. e clin. ocul. 72:588-596, Oct., 1946.

A frequent cause of accommodative asthenopia is asymmetry or decentratibn of the cornea with respect to the pupillary aperture. This lack of coincidence of the optical center of the cornea with the center of the pupil gives rise to astigmatism quite independently of the curvature of the refractive surfaces of the eye. Correction of the corneal astigmatism as determined with the ophthalmometer is not enough; the total resultant astigmatism of the eye must be accurately corrected.

For objective determination of the astigmatism Carlevaro recommends axial or macular retinoscopy with Maggiore's retinoscope, which employs a transparent glass reflector instead of an opaque mirror with a central aperture. The asymmetry or decentration of the cornea may be studied with Gullstrand's square, but keratoscopic examination is neither easy nor rapid, and only the subjective tests can be relied upon for accurate determination of the total astigmatism.

In view of this factor of decentration it can be readily seen why the degree of astigmatism and the direction of the principal meridians may vary with the size of the pupil. Hence sometimes the astigmatic correction for near must differ from that prescribed for distance. A patient may incur accommodative asthenopia by holding his work very close, even though he is not myopic, in order to benefit by the smaller pupillary aperture which reduces the astigmatism due to asymmetry.

Attention is likewise called to the importance of asymmetry in the optics of aphakic eyes, especially where there is a coloboma, and of eyes that have suffered trauma in the anterior segment.

Harry K. Messenger.

Cibis, Paul. **Contribution to the pathology of the adaptation of definite retinal areas.** Arch. f. Ophth. 148:1-92, 1947.

The author studies form and color fields campimetrically. His purpose is to determine the time parameter involved in this test. He uses a Bjerrum screen 130 by 130 cm. in size at a distance of 115 cm. The time is measured which passes by before an object of definite size, color,

and brightness disappears. By help of a stopwatch the disappearance of the object is recorded for one or more meridians at different distances from the point of fixation. Daylight serves as illumination. The objects used are Engelking-Ecksteins pigments that have an area of 10, 20, and 30 square millimeters and are placed on a gray background of the same brightness. Practically the procedure is almost the same as in ordinary campimetry except that usually in perimetry slight movements of the object are preferred whereas in studying the "local adaptation" of the retina the object must be completely at rest. The resulting curves for the normal show a certain range of variation and resemble Wertheim's curve for peripheral visual acuity. Deviations from the normal were found in disturbances of color vision, diseases of the choroid, retina, visual pathways, and cortex, and in cerebral trauma. The studies will be completed by a second contribution.

E. Schmerl.

De Leonibus, Fernando. **Investigations concerning the shape of the conical cornea.** Boll.d'ocul. **26**:433-448, July, 1947.

Six conical corneas were meticulously measured. Readings were taken at the center, and 4, 8, 12 and so on to 32 degrees above, below, nasally and temporally from it in the two meridians of greatest dioptric difference. In six tables and diagrams the results concerning radius of curvature and refractive power are demonstrated. These measurements, taken with the Helmholtz-Javal-Schiøtz ophthalmometer, show that there was no approximately spheric zone in the center in any of the eyes and that a decentration of the corneal vertex was present in all of them; the refractive power was unusually high in at least one of these eyes, in which it was reaching 140 diopters maximally. (Bibliography.)

K. W. Ascher.

Goldmann, H. **Contribution to angioscotometry.** Ophthalmologica **114**:147-158, Sept., 1947.

The purpose of this study was to investigate the basic mechanism underlying the scotomas which conventionally are designated as angioscotomas. Goldmann has found that the width of a certain angioscotoma (near the upper border of the blind spot) depends characteristically upon the contrast between target and background: The greater the contrast the narrower the scotoma. The increase in width caused by the decreasing contrast occurs in asymmetric fashion, the scotoma gaining in width chiefly in the direction in which the target is carried across the field. The increase in the width of angioscotomas that occurs characteristically after compression of the globe or neck compression also occurs in asymmetric fashion. The point of disappearance of the target remains more or less the same while the place of reappearance is shifted under these experimental manipulations.

Similar observations have been made with a setup that creates an artificial scotoma when a projected target disappears over a bandshaped area because of lack of a reflecting background. The author explains the asymmetric character of the natural angioscotomas and their artificial counterparts as a phenomenon of spatial summation (see Marshall and Talbot, Visual mechanisms, the Jacques Cattell Press, Lancaster, Pa., 1942).

Peter C. Kronfeld.

Hartridge, H. **Some fatigue effects on the human retina produced by using colored lights.** Nature **160**:538-539, Oct. 18, 1947.

From his experiments the author concludes that fatiguing the eye to rays from about 65μ to 55μ causes changes in the red, yellow, and green parts of the spectrum but fatiguing the eyes simultaneous-

ly to these rays and to greenish-blue rays, produces little or no effect. The latter rays appear to inhibit the onset of the fatigue effects which rays from 65μ to 55μ would otherwise produce.

F. M. Crage.

Hecht, S., and Hsia, Y. **Colorblind vision. 1. Luminosity losses in the spectrum for dichromats.** J. General Physiol. **31**:141-152, Nov. 20, 1947.

The authors feel that there is no completely adequate theory of color vision. The one having the most reasonable basis is that formulated by Young in 1807 which assumes the existence of three receptor systems in the retina for blue, green, and red. Young's supposition that colorblindness was due to the loss of one of these three receptor systems is still held in some form or other.

The author's dark-adapted foveal threshold test values of normal and color blind persons supports this theory of colorblindness but not the notion that these three systems contribute equally to the brightness of the spectrum. Because of this and because the color sensations reported by color blind persons do not support the idea of a lost or inactivated receptor system, they feel that a fresh explanation for colorblindness is necessary.

F. M. Crage.

Jaeger, Alfred. **The changes in the barrel shaped distortion by the eye.** Arch. f. Ophth. **148**:152-161, 1947.

The author finds this distortion more pronounced for closer than for more remote objects. Demonstration of the phenomenon by the use of the checkerboard pattern is correct only for a definite distance of the observer from the object.

E. Schmerl.

Lindner, K. **The influence of environment and heredity on the development of school myopia.** Wien. Klin. Wchnschr. **59**:867-868, Dec. 31, 1947.

Lindner mentions various theories about school myopia and discusses Steiger's theory which attempted to explain the elongated myopic eye on the basis of growth variation. The author obtained statistics from the Vienna and St. Poelten arch-diocese where he found that 48 percent of the Catholic clergy were myopic. He presents tables showing the amount of myopia, age and occupation of the parents of the priests most of whom did manual labor.

The anlage for both school myopia and for high myopia is similarly and rather evenly distributed in the population, therefor an environmental factor must be assumed. If this factor appears late, then the development of myopia begins late, too. Even though we are sure that so-called school myopia is hereditary, it does not develop without the influence of an environmental factor.

Theodore M. Shapira.

Mihalyhegyi, G. **New experiences with contact lenses.** Ophthalmologica **114**:159-167, Sept., 1947.

The author's experiences with plastic contact lenses made from molds of the anterior segment have not been unusual and will therefore hardly be "new" to the American reader. Peter C. Kronfeld.

Obrig, T. E. **Solutions used with contact lenses.** Arch. Ophth. **38**:668-676, Nov., 1947.

A research program was conducted throughout the year 1945 to obtain more information concerning the causes and prevention of clouding of the corneal epithelium by solutions used with contact lenses.

To eliminate varying personal equations, Obrig used his own eyes exclusively and employed the same pair of contact lenses in all experiments. The addition of carbon dioxide or oxygen to solutions for use with contact lenses did not

affect the time in which corneal clouding occurs. Solutions with osmotic pressure as high as that of 2.8-percent sodium chloride solution can be worn if the pressure is increased gradually. Correct osmotic pressure is important. The addition of amino acids and methyl cellulose to the solutions increases the time before clouding of the cornea occurs.

R. W. Danielson.

Pace, Mario. **The "invisible spectacles" and their practical use (new contact lenses made of plastic).** Boll. d'ocul. **26**:481-504, Aug., 1947.

This is a rather complete review of the pertinent literature with justified criticism of the exaggerations noted. (3 pages of references.) K. W. Ascher.

Rocco, Alfredo. **Color vision.** Arqu. brasil. de oftal. **10**:79-91, 1946.

The various grades of perfection or defect in color vision are briefly described, from heptochromia down to monochromia and achromia. The significance of the chromatic sense in relation to aeronautics is discussed. W. H. Crisp.

Ronchi, Vasco. **Recent theoretical developments concerning shape and color perception.** Boll. d'ocul. **26**:281-316, May, 1947.

Rayleigh's rule lacks experimental verification. The resolving phenomena of the retina as well as of the photographic film are to be understood energetically rather than in the classic formal way. The photochemical deductions of Hecht will prove more helpful in understanding of the visual and acoustic phenomena, and also of color vision. The trichromatic explanation of color vision will have to be replaced by the assumption of a binary retinal mechanism; this will also explain the Purkinje effect in reduced illumination. (16 figures, 23 references.)

K. W. Ascher.

Santoni, A. **Contribution to the study of the form of the posterior segment of the globe in very high ametropia.** Ann. di ottal. e clin. ocul. **72**:577-587, Oct., 1946.

With the aid of leaden casts made from formalin-hardened eyes it was found that the curvature of the posterior segment of both highly myopic and highly hypermetropic eyes is approximately elliptical and that the radius of curvature in each case is noticeably less than in emmetropic eyes. Diagrams with measurements and calculations are given.

Harry K. Messenger.

Schober, Herbert. **Color blindness due to head injury.** Arch. f. Ophth. **148**:93-100, 1947.

In 1945 the patient was treated for a gunshot wound in the midline of the occipital bone. The underlying tissue was slightly involved. An examination of the eyes in 1946 revealed homonymous scotomas in the right upper quadrants. Color vision was tested according to Holmgren, Stilling and Nagel. Symptoms of protanopia as well as deuteranopia were found. Purkinje's phenomenon was missing, the adaptation to light was delayed. The findings are discussed in relation to the theories of color vision.

E. Schmerl.

Schober, Herbert. **Night myopia and its causes.** Arch. f. Ophth. **148**:171-186, 1947.

Starting from the observation that at night sailors give their telescopes a turn to the minus side the author studied the phenomenon of night myopia in 12 persons. Several hundred tests with telescopes were made and night myopia was found in almost all of the tested persons. The average value amounted to -2.0D, with a standard deviation of ± 1.5D. To some extent the adjustment of the telescopes or the amount of night myopia depended upon the weather and the color of the observed object. With dimness the

composition of the natural light shifted to bluish green and the myopia increased by −0.5D. The myopia increased with the decrease in brightness of the observed object. The night myopia stimulated retinal sensitivity to light and it decreased the visual acuity. As possible factors that might produce night myopia the tendency to increased accommodation in the dark, and the increase in sensitivity to light are considered. This increased sensitivity in night myopia is caused by the formation of larger circles of diffusion on the retina. In emmetropia punctual imagery would have been produced. (References.)

E. Schmerl.

Sloane, Albert E. **Refraction clinic. Discussion.** Am. J. Ophth. **31**:213-214, Feb., 1948.

Stoll, M. R., and Boeder, P. **Stereoscope as training instrument.** Arch. Ophth. **39**:27-36, Jan., 1948.

This technical paper discusses the theory and use of the Brewster stereoscope. (2 figures, 2 references.)

R. W. Danielson.

von Tschermak-Seysenegg, Armin. **The principle of spatial coöperation of the eye muscles.** Arch. f. Ophth. **148**:101-106, 1947.

The author presents a description which is largely a summary of his former studies of this problem. E. Schmerl.

Veloso, Paulo. **Recreative optics.** Rev. brasil. oftal. **6**:75-84, Dec., 1947.

Optical illusions are described and illustrated by the various geometric figures commonly included in the literature of this subject. W. H. Crisp.

5

DIAGNOSIS AND THERAPY

Borioni, Domenico. **Metastatic meningococcic ophthalmia favorably treated with penicillin.** Boll. d'ocul., **26**:337-339, May, 1947.

Intravenous, intramuscular, and subarachnoid application of penicillin influenced favorably a case of meningococcic meningitis associated with unilateral endophthalmitis in a two-year-old girl.

K. W. Ascher.

Bothman, Louis. **Minor surgery of the eye.** Surg. Cl. North America pp. 46-55, Feb., 1948.

This article is written for the nonophthalmologic practitioner. It is a series of brief descriptions of ocular diseases and injuries with equally brief consideration of the fundamentals of treatment. The author recommends the use of the 2-percent solution of pyribenzamine in cases of allergic conjunctivitis. The McReynolds technique for transplanting pterygia is described briefly. He also describes briefly the principles of closure of lacerations of the lids, emphasizing that through-and-through lacerations should be closed in layers.

The author describes principles of the removal of foreign bodies and warns against the use of anesthetic ointment by the patient in the home because of possible delayed corneal healing and the production of corneal ulceration. The treatment of various types of burns of the globe and of serpentic ulcers is outlined. For the treatment of acid burns irrigation with 3-percent sodium bicarbonate solution is suggested and for alkali burns 10-percent neutrol ammonium tartrate.

Benjamin Milder.

Fox, S. A. **Use of preserved cartilage in plastic surgery of the eye.** Arch. Ophth. **38**:182-191, Aug., 1947.

Cartilage obtained at autopsy and preserved in merthiolate solution may be used in plastic surgery. Under proper conditions it may be kept for use as long as

two years. The use of isografts with this "pickled" cartilage is often easier and more satisfactory than the use of fresh autografts. Seventeen cases are reported in which preserved cartilage was used as an isograft. In four cases it was used in reconstruction of the lid to replace a lost tarsal plate. In nine cases preserved cartilage was used inside the orbit to repair depressions of the floor and walls due to fractures. The results were good.

John C. Long.

Levitt, J. M. **Guarded muscle scissors.** Arch. Ophth. **39**:93, Jan., 1948.

In order to make the scissors safer in surgical procedures the author has modified the Aebli scissors by putting small spherical knobs in the ends and added elevator guards halfway between the tips and the screw. (1 diagram.)

R. W. Danielson.

Reeh, M. J. **Use of the goniolens for diagnosis of retained foreign body in the anterior chamber.** Am. J. Ophth. **31**:336-337, March, 1948.

6
OCULAR MOTILITY

Bartels, Martin, **Nervous factors affecting the ocular movements.** Arch. f. Ophth. **148**:107-110, 1947.

Using a schematic drawing the author enumerates a number of factors which in men, mammals, and lower vertebrates cause ocular movements. Stimuli might arise from the vestibulum, the neck, the frontal cortex, the corpora quadrigemina, the nucleus ruber, the cerebellum, the sympathetic, the cutis, the retina, the cochlea, the contents of the orbit, the movement of the limbs or the pelvis and from the urge to fuse the images.

E. Schmerl.

Cushman, B., and Sarro, L. **Vertical anomalies—presentation of vertical anomalies in 100 cases studied.** Quart. Bull. Northwestern Univ. Med. Sch. **22**:17-20, 1948.

Patients with strabismus who get no improvement from lenses or means other than surgical usually have a vertical imbalance. In operative failures a vertical imbalance is almost always found. A bilateral recession gives the most satisfactory result in uncomplicated convergence excess. A conservative recession of one or both external rectus muscles is indicated in uncomplicated divergence excess. If these anomalies are complicated by a vertical imbalance, there may be an undercorrection, but usually a marked overcorrection. In convergence insufficiency with secondary divergence excess or primary divergence excess, if complicated by hypertropia the result may be a definite overcorrection, but more probably an undercorrection. Of 100 patients who had ocular muscle imbalance 71 had vertical anomalies which required surgery. Vertical anomalies should be suspected in every case of imbalance. Irwin E. Gaynon.

Miles, P. W. **Clinic for binocular problems. Three emmetropic patients treated with aniseikonic glasses over 8- to 10-year periods.** Am. J. Ophth. **31**:333-336, March 1948. (3 references.)

Ribas Valero, Ramón. **Biastigmatism and bicylinder combinations.** Arch. Soc. oftal. hispano-am. **7**:858-889, Sept., 1947.

The subject is extensively reviewed.

J. Wesley McKinney.

Zavalia, A. U. **Divergence paralysis.** Arch. Soc. oftal. hispano-am. **7**:890-898, Sept., 1947.

The characteristic findings of divergence paralysis are listed. There is homonymous diplopia for all objects beyond a certain distance, usually 25 to 50 cms. The angle of the deviation remains unchanged or decreased in secondary

positions of gaze. If an object is brought near to the patient, the two images approach each other and finally fuse when the object is 15 to 20 cms. away. When the object is brought still nearer, insufficient convergence causes crossed diplopia. Prisms base out give binocular single vision throughout the entire field of binocular fixation. There is no restriction in the field of fixation in either eye. The angle of the deviation is relatively constant on repeated examinations. The author reports a case of divergence paralysis. A 40-year-old man complained of diplopia of a few days duration. The images are not clear and, in trying to fixate, the images separate more. The eyes seem to be normal and no past history of any illness is given. There is hyperopia of one diopter in each eye. When vision is fixed at distance the eyes seem to be in orthophoria, but the patient sees a double image of light at 5 meters. Fusion of the images begins at 33 cms. and is held when the light is brought to 9 or 10 cms. consequently there is no convergence insufficiency. The diplopia is overcome with a prism of 10 diopters base out. Binocular single vision is conserved in all the fields of vision with this prism. Repeated examinations gave the same findings. Adequate glasses were prescribed and a month later at the patient's last visit all troubles had disappeared.

J. Wesley McKinney.

7

CONJUNCTIVA, CORNEA, SCLERA

D'Ombrain, Arthur. **The surgical treatment of pterygium.** Brit. J. Ophth. **32**:65-71, Feb., 1948.

The author enthusiastically presents a method of surgical removal of pterygium evolved over many years. To the principles of excision of the head and the leaving of a perilimbal strip 4mm. in width, he added complete excision of all submucosal tissue from the limbus to caruncle. No sutures are used. This has yielded uniform success for the past seven years. He also discusses the pathology of the condition and concludes that pterygium is an irritative and secondarily a degenerative disease. (5 figures.)

O. H. Ellis.

Murray, W. B. **Notes on trachoma.** Canad. M. A. J. **58**:81-82, Jan., 1948.

In his "notes on trachoma" the author aims to arouse the interest of the general practitioner to the problem of trachoma in western Canada. There the disease exists among Indians, Orientals and Central Europeans, and should be looked for in service men returned from Africa and Italy. Inflamed eyes should be watched with suspicion and prompt, proper treatment started before the serious complications appear. Symptoms, signs, diagnosis, and treatment are briefly discussed.

Francis M. Crage.

Panzardi, Domenico. **Use of fetal membranes for conjunctival plastic, particularly for pterygium.** Boll. d'ocul. **26**:332-336, May, 1947.

Amniotic membrane was used in seven cases of severe symblepharon, one case of diffuse papillomatosis, and in 11 cases of pterygium. The results were satisfactory except in eyes with symblepharon. The fetal membranes were obtained from definitely healthy mothers and were kept in Ringer's solution before the implantation.

K. W. Ascher.

Romero, Eduardo. **Keratitis due to vapor of alcohol.** Arch. Soc. oftal. hispano-am. **7**:912-914, Sept., 1947.

The author has observed an especial type of keratitis caused by alcohol fumes from shampoo. He does not agree with Valdecasas, who believes that the corneal damage is due to the caustic effect of chirmoya seeds, commonly steeped in al-

cohol and used as a treatment for head lice. J. Wesley McKinney.

Sorsby, Arnold. **The incubation period of ophthalmia neonatorum.** J. Obst. and Gynec. Brit. Emp. **54**:842-847, Dec., 1947.

Of 290 consecutive cases of ophthalmia neonatorum, 84.5 percent occur within the first 10 days of life. In the first 5 days of life one sees 70 percent of gonococcal ophthalmia, 50 percent of diphtheroid, 37 percent of staphylococcal and occasional cases of inclusion blennorrhea. Of inclusion blennorrhea 20 to 25 percent begins between the 11th and 15th day of life.

Irwin E. Gaynon.

8

UVEA, SYMPATHETIC DISEASE, AQUEOUS

Drell, M. J., Miller, C. P., and Bohnhoff, M. **Gonorrheal iritis.** Arch. Ophth. **38**: 221-244, Aug., 1948.

A technique for producing gonorrheal iritis in the rabbit eye is reported. The percentage of eyes yielding cultures containing the gonococcus fell progressively during the first week after inoculation. Thereafter, the infection became chronic in about one third of the eyes. It seemed that injury to the lens was the major factor in making the infection chronic.

The rabbit eyes exhibited many of the gross appearances of human gonorrheal iritis. The histologic picture was initially that of an acute fibrinocellular response and later that of a chronic inflammatory process. The inflammation remained localized to the anterior segment of the eye. The experimental infection lent itself well to in vivo testing of gonococcidal agents.

John C. Long.

Hayden, R. **Questionable sympathetic ophthalmia.** Proc. Ophth. Soc. Vienna p. 13, April 27, 1924.

Seven weeks after perforating injury to the left eye mild iridocyclitis of the right eye started. The exciting left eye was not enucleated because it had comparatively good vision and because, according to Hayden and Lindner, there is still no proof that removing of the exciting eye really can influence the course of established sympathetic inflammation. Vision in both eyes became nearly normal.

F. Nelson.

Lindner, K. **Case of expulsive hemorrhage operated with scleral trephining.** Proc. Ophth. Soc. Vienna p. 12, April 27, 1942.

A man, 63 years of age, with traumatic dislocation of the lens into the vitreous body, was operated upon with a loop after iridectomy. Immediately after removal of the lens a large choroidal detachment developed temporally. The sclera was immediately trephined and blood released through the opening. The bleeding stopped but another choroidal detachment began in the nasal section. Here again the sclera was trephined. The eye became blind. F. Nelson.

Pincus, M. H. **Aniridia congenita: report of five cases; genealogy; possibilities of treatment.** Arch. Ophth. **30**:60-66, Jan., 1948.

Five cases of bilateral aniridia, with the genealogic charts and a discussion of the possibilities of treatment, are presented.

Several useful procedures are available to help unfortunate persons with this defect to obtain and to maintain useful vision. In order to be effective, treatment should be started early in life. Tatooing of the outer portions of the cornea, extraction of a cataractous lens and the wearing of an opaque contact lens with a 3 to 4-mm., clear central pupil are the methods of choice. (4 figures, 5 case histories, 12 references.) R. W. Danielson.

Scholz, R. O. **Epivascular choroidal pigment streaks, their pathology and pos-**

sible prognostic significance, additional cases. South. M. J. **41**:112-118, Feb., 1948.

Three more cases are added to a previous report, and the literature is reviewed. The generally poor prognosis after the discovery of the fundus picture is discussed. The streaks consist of clumps of pigment deposited serially over partially but not completely sclerosed choroidal vessels. They appear not unlike a chain of black beads, and usually begin one to two disc diameters below the papilla, extend radially, and sometimes are seen far in the periphery. They must be differentiated from angioid streaks, pigment streaks following retinal detachment, and perivascular choroidal pigment atrophy. (8 figures, references.)

Bennett W. Muir.

Thomas, M., and Burnside, R. **Fibrous exudative cysts of the iris.** Am. J. Ophth. **31**:331-333, March, 1948. (1 figure, 2 references.)

9

GLAUCOMA AND OCULAR TENSION

Brausewetter, G. **Comparison between Elliot trephining and Holth iridencleisis.** Proc. Ophth. Soc. Vienna p. 6, Jan. 19, 1942.

Seventy-five patients with chronic simple glaucoma submitted to Elliot trephining in one eye and Holth iridencleisis in the other. The tension was lowered in 77 percent of all cases. Second operations were necessary after 11 Elliot operations and 19 Holth. Eventual blindness resulted within four years in 13 Elliot operations and 11 Holth. No infections followed the Holth procedure. After the Elliot operations five eyes were infected and three lost. F. Nelson.

Christini, H. **Precapillary and capillary function in glaucoma.** Ann. d'ocul. **180**: 530-541, Sept., 1947.

The same vascular degenerations which are at least a factor in practically all glaucomas also exist throughout the body. They are principally arteriolar. Microscopic thinning and atrophy is observed much more frequently in arterioles than venules. Ocular tension is an expression of the hydrostatic pressure in the uveal vessels diminished by the colloidal osmotic force of the plasma proteins, or the balance between intra-ocular secretion and reabsorption.

To coordinate precapillary and capillary function with intra-ocular tension, similar studies were made in 20 persons between the ages of 45 and 65 years with glaucoma and numerous similar persons without glaucoma. These studies included nasal septum oscillograms representing the capillary bed, subungual photoplethymographs representing the precapillary bed and measurements of intra-ocular tension. Coördinated graphs of these data were made before the inhalation of amyl nitrate during the vasodilative phase, and during the vasoconstrictive phase. In the glaucomatous before amyl nitrate inhalation the pulse volume was reduced in the nasal septum but not subungually. During the vasodilative stage changes in the nasal septum were practically nil and during the subsequent vasoconstrictive stage, pulse reduction, especially subungually, was less than in the non-glaucomatous. In the glaucomatous, the capillary and especially the precapillary bed does not react normally to vasodilators. One of the principal and initial causes of ocular hypertension in chronic glaucoma is precapillary arteriolar degeneration occurring also in the posterior uveal vessels. The hydrostatic factors involved in intra-ocular secretion and absorption are altered and vascular permeability is affected. Chas. A. Bahn.

Schorn, Julius. **Glaucomatous attack and weather.** Arch. f. Ophth. **148**:121-128, 1947.

Ninety-one patients are studied. In 78 percent of the cases the glaucomatous

attack coincided with atmospheric changes, especially those in temperature.

E. Schmerl.

Wessely, Karl. **Problems of glaucoma.** Arch. f. Ophth. **148**:111-120, 1947.

I. Glaucoma in excessive myopia. The author surveys 54 of his cases of glaucoma in myopia of more than −8.0D. He emphasizes the insidious development of the increase in tension, the pale, atrophic appearance and rather shallow excavation of the papilla and the frequent occurrence of glaucoma in surgical aphakia. II. Hemorrhagic glaucoma. A report of cases with thrombosis of the central retinal vein in one eye and chronic glaucoma in the other eye is presented. A common cause of both phenomena is considered.

E. Schmerl.

10

CRYSTALLINE LENS

Alexander, G. F. **The size of the standard eye and limbal sections.** Tr. Ophth. Soc. U. Kingdom. **65**:232-239, 1945.

The author presents a highly mathématical paper with formulas for the type of knife that is best suited for a perfect cataract section. The perfect cataract section must be adjusted to the size of the lens. He found that the one-third section would suffice for ordinary cataracts, the two-fifths section should be reserved for especially large and hard lenses, and the four-ninths sections for the intracapsular removal of the lens. He discusses five characteristics of the perfect cataract section. A Beer pattern knife was accepted as ideal with a blade 26 mm. long, a base of 7 mm., and a point angle of 20° with a stop to prevent the point from moving within the limbus farther than 14 mm. (3 figures.) Beulah Cushman.

Daily, Louis, Jr., and Daily, Ray K. **A procedure to facilitate intracapsular forceps extraction of intumescent cataracts.** Am. J. Ophth. **31**:328-330, March, 1948. (7 references.)

Roper, K. L. **Lancaster's technique of cataract extraction.** Illinois M.J. **93**:81-91, Feb., 1948.

The author describes in detail his modification of Lancaster's technique for cataract extraction. This technique is best suited for combating the major postoperative complications:—loss of vitreous, expulsive hemorrhage, delayed reformation of the anterior chamber, hyphema, iris prolapse, retinal detachment, secondary glaucoma and high degrees of astigmatism.

Essential features of the procedure are the use of the O'Brien akinesia with basal anesthesia, topical cocaine, and for prolonged effect, the subconjunctival and retrobulbar injection of a mixture of novocaine-pontocaine-cobephrin. Superior rectus bridle suture is used. The conjunctiva is incised from nine to three o'clock at the limbus and dissected back in the superior quadrant. After making a limbal groove with the Lancaster guarded knife, three appositional corneo-scleral sutures, similar to those used by McLean, are placed but not tied. Section is made with keratome and scissors. The author prefers peripheral button-hole iridectomy and an intracapsular extraction of the lens, where possible. Sutures are tied over the conjunctival flap, drawing the flap over the wound.

Results of 125 consecutive cataract operations, performed by this technique, are summarized. Seventy-four percent of the author's operations were of the intracapsular variety. The incidence of complications is strikingly low in all respects. The average postoperative astigmatism amounted to 0.85 diopters.

Benjamin Milder.

Schiff-Wertheimer, S., and Sedan, J. **Total lens extraction in retinal detachment.** Ann. d'ocul. **180**: 513-520, Sept., 1947.

Is retinal detachment more frequent after intra-capsular or extra-capsular lens

extraction? Older statistics say yes, but the authors believe no, because older statistics were inaccurate and incomplete. The 1.3 percent of retinal detachment that statistically follows cataract extraction depends on numerous factors. Complications and failures are as frequent as vascular and other senile degenerative processes. Removal of the lens capsule in intracapsular extraction potentially increases the vitreous vibration and alters retinal tension especially during ocular movement. In the predisposed, retinal detachment is thus facilitated. In the young, intracapsular extraction is contra-indicated and in the middle aged it does not increase the risks of failure. The authors analyze 25 cases of retinal detachment in eyes which were previously operated upon for cataract by the intra-and extracapsular methods. Of these detachments, 60 percent were greatly improved by subsequent operation. In three of them 1½ years elapsed between the injury and the retinal detachment. Generally speaking, the authors believe that the technique and the trauma involved in the operation is more important than the type of operation technique employed. The importance of accurate and complete binocular examination is stressed. Chorioretinal disease and other evidence of constitutional or other degenerations due to injury or disease which may effect the advisability of the cataract extraction as well as the risks of the subsequent retinal detachment are sought. Chas. A. Bahn.

11
RETINA AND VITREOUS

Bagley, C. H. **Retinal detachment. A survey of the etiology and results of treatments on phakics and aphakics.** Am. J. Ophth. **31**:285-289, March, 1948. (26 tables, 14 references.)

Dollfus, M. M. A. **Late results in retinal detachment surgery.** Ann. d'ocul. **180**:547-552, Sept., 1947.

This interesting study of approximately 50 eyes successfully operated upon ten or more years previously for primary retinal detachment is most enlightening. In 90 percent, the location of original tears was visible. The operative techniques used included those of Gonin, galvano cauterization with juxtachoroidal tunnelization of Paufique, Coppez, cauterization with the pyrometric electrode, Weeve's with the perforating electrode, Guist's with potassium hydrate pencil, and Hudello's by electrolysis. The first was apparently the most efficient. Only 15 percent developed recurrences, and of these only 10 percent occurred more than six months after operation. The number of recurrences paralleled the number of detachments in the contralateral eye. Recurrences had no relation to the operative technique used. Drawings made at the time of operation showed that little or no progressive damage had been done in either retina or vitreous by the retinal detachment operation. Seventy percent did not have pathologic lens changes of importance. Detachment in the eye that was not operated upon was responsible for more cataracts than were observed in the eye that was. In 35 percent vision was better ten or more years after than at the time of operation. In fifty percent of those studied the ultimate vision in the eye with a successful operation was 0.2 or worse. The other visions ranged rather uniformly up to 0.6.
Chas. A. Bahn.

Eisenberg, I. J. **Congenital retinal fold with vitreous disorganization. A case report.** Am. J. Ophth. **31**:337-338, March, 1948.

Foroni, Camillo. **New pathogenetic conception and treatment of retinosis pigmentosa.** Boll. d'ocul. **26**:505-524, August, 1947.

Observation of 15 cases during 30 years convinced the author that retinosis pig-

mentosa was caused by an intoxication of the inner membranes of the eye that originated from a hidden chronic infiltration inflammation of the bulbar conjunctiva; heredity and febrille diseases are contributing factors. Without histopathologic evidence this etiologic conjunctivitis was assumed because of the difficulty encountered during retrobulbar or subconjunctival injections. For it, intensive massaging of the bulbar conjunctiva with a glass or metal spoon is suggested. This new procedure, called massoressi, produces extensive hemorrhages which the author considers to be pathognomonic. He even advocates it as a preventive measure to prevent retinal disease and claims secure and permanent arrest of retinal degeneration, rarefaction and eventual disappearance of the retinal pigment spots, and sometimes even an increase of visual acuity and improvement of visual fields and of hemeralopia.

K. W. Ascher.

Grafton, E. G., Jr., and Guyton, J. S. **The value of injecting saline into the vitreous as an adjunct to diathermy operations for retinal detachment.** Am. J. Ophth. **31**:299-303, March, 1948. (3 tables 5 references.)

Lindner, K. **Two especially interesting cases of shortening of the bulbus.** Proc. Ophth. Soc. Vienna p. 3, Jan. 19, 1942.

A male, 31 years of age, with disseminated choroiditis, dislocated lens and amaurosis in left eye developed a retinal detachment in the right eye one month after cataract operation which improved temporarily under conservative treatment. Deterioration started again 1½ years later and vision was reduced to recognition of hand movements eccentrically. No tear was found. First the upper half of bulbus was shortened by 2 mm., two months later the lower half, and partial reattachment and improvement of the function resulted. Deterioration again set in after several months. Eventually complete reattachment was achieved after a third shortening operation in the temporal section. Corrected vision 6/24 and Jaeger 2 resulted.

The other patient; a man, 47 years of age, who had been operated upon for nuclear cataract in each eye at the age of eight years, developed retinal detachment in the right eye three years later. The eye became blind. The left eye developed chronic glaucoma 22 years after the cataract operation. A "trephining-cyclodialysis" was performed with loss of some vitreous. Subsequently there was retinal detachment of short duration. After reattachment there again was increase of tension. About seven years later retinal detachment was again noted but no tear found. A large radial resection of sclera was done above and temporally without improvement. A second excision in the upper half of the sclera several months later was temporarily successful. During the second postoperative week the scleral wound ruptured and a large staphyloma resulted. This was excised and the sclera sutured with silk. The end result was a partial reattachment and the corrected vision equalled 3/36. F. Nelson.

McKerman, R. L., and Lavery, F. S. **Bilateral retinal detachment.** Tr. Ophth. Soc. U. Kingdom **65**:409, 1945.

The history of a patient with bilateral retinal detachment, 49 years of age, is presented. In each eye a "staphylomatous area" of the sclera was found during the operation. The first eye was suspected of having an intraocular tumor during the operation and the eye was enucleated. Ten months later he lost vision in the other eye because of a retinal separation. A staphyloma of the sclera was found and the conjunctiva closed.

Beulah Cushman.

Meyer-Schwickerath, Gerhard. **"Gliomarosettes" and similar formations.** Arch. f. Ophth. **148**:139-151, 1947.

Forty-six cases of "gliomas" (retinoblastomas) were studied histologically. Thirteen times rosettes were found. They are described as spherical incompletely closed shells consisting of 60 to 70 tumor cells each. Folding of the retina and retinal rosettes occurred in nine of the 46 eyes. The retinal rosettes consisted of cells of the sensory epithelium. They are said to differ from the gliomo rosettes morphologically as well as ontogenetically. The discussion of the findings refers to Bailey's and Cushing's work. (References.) E. Schmerl.

Michaleson, I. C. **Retinal artery occlusion. A report illustrating the pathogenesis of the fundal appearances and the effect of acetyl-choline.** Brit. J. Ophth. **32**:111-117, Feb., 1948.

The author presents an interesting experience of occlusion of the macular branch of the inferior temporal retinal artery of six days duration in a woman, 41 years of age. A retrobulbar injection of acetyl-choline relieved the spasm and restored the circulation; however, there was no notable change in the diameter of the other retinal vessels. The capillary stasis and anoxemia resulting from the diminished arterial inflow had produced a large white opacity of the retina which rapidly disappeared after the injection. (4 figures.) O. H. Ellis.

Loewenstein, Arnold. **Intramural vascular system (vasa vasorum) in retinal vessels.** Arch. Ophth. **39**:9-26, Jan., 1948.

Vessels within the wall of retinal vessels have not hitherto been recognized. In general, only the walls of vessels with a caliber greater than 1 mm. are provided with vasa vasorum. The latter arise from adjacent small arteries and form a dense capillary network in the adventitia.

In unstained retinal specimens cleared in glycerin the author found that capillaries are present in many sclerosed vascular walls. Hemorrhage into the diseased wall from these intramural vessels is frequent, especially in cases of vasculitis retinae. He has not yet observed intramural retinal vessels in normal eyes.

New formation of vessels in the diseased retina is a well known fact, but the existence of intramural newly formed retinal vessels was not known. They seem to serve to improve a disturbed nutrition of the walls where new vessels have been described. The intramural vessels may serve to transport blood over an occluded or narrowed part of the lumen. (18 figures, 11 references.) R. W. Danielson.

Pridle, Ronald. **Miliary aneurysms with retinal degeneration.** Bull. Guthrie Clin. **7**:128-131, Jan., 1948.

The author presents a white male, 12 years of age, with miliary aneurysms of the right eye. There was an associated extensive macular atrophy with pigmentation. Other atrophic and pigmentary areas were present in the lower temporal quadrant. A grayish connective tissue mass covered the lower half of the disc. The hyaloid artery was large and persistent. The eye had never been injured. The child had had severe pneumonia when he was 1½ years old. This was followed by perineal abscess and bilateral otitis media. He had recurrent croup until he was nine years old and tonsillectomy and adenoidectomy when eleven. The youngster is now healthy, robust, cooperative, and intelligent. All clinical and laboratory investigations were negative.

The author says that it will be interesting to observe whether this is truly a case of miliary aneurysms with retinal degeneration or an early case of angiomatosis or Von Hippel's disease.

Francis M. Crage.

Puntenney, Irving. **Vascular fundus disease with especial reference to the classification of Gifford and MacPherson.** Quart. Bull. Northwestern Univ. Med. Sch. **22**:74-79, no. 1, 1948.

A modification of the Gifford and MacPherson classification is suggested to include essential hypertension in Groups 1 and 2 and the collective grouping of pure angiospasm with well developed essential hypertension in groups 3 and 4.

Irwin E. Gaynon.

Shapland, C. D. **Traumatic detachment of the retina.** Tr. Ophth. Soc. U. Kingdom **55**:187-211, 1945.

The author reports 16 patients with detachment of the retina while in military service. They averaged 12 years younger than a group of 425 civilian patients that he reported in 1933. The reposition was achieved in 10 of the military men and in less than one-half of the civilians. Eleven of the military men were emmetropic or had hypermetropia and there was no aphakia, whereas myopia was common and of higher degree in the civilians.

Beulah Cushman.

Weekers R., Roussel, F., and Heintz, A. **Visual recovery after successful retinal detachment surgery.** Ann. d'ocul. **180**:521-529, Sept., 1947.

Defective central and peripheral vision, light adaptation, and fusion frequently follow successful retinal detachment surgery. After three months no operation can restore visual function completely. Central and peripheral retinal degenerations are frequent, as are central scotomas which may cause twilight amblyopia. The chorioretinitis produced by operation shrinks one or more isopters and often disorganizes fusion. Efficient preoperative examination usually indicates the prognosis, the surgical risks involved, and the most desirable technique.

In the twenty-five retinal detachments successfully operated upon by the authors they used superficial non-perforating coagulating diathermy, perforating diathermy, and the evacuation of subretinal fluid with galvanocautery. Repeated extensive detailed examinations were made before and after operation. The importance of potentially pertinent subjective information is stressed.

The rods and cones and the pigment epithelium depend primarily upon the chorio-capillaris for nutrition. The retinal and subretinal fluid is normally biologically similar to the other body tissue fluids. During detachment it becomes lowered, and oxidation and glycolysis are retarded. Evidences of temporary or permanent retinal ischemia and anoxemia are therefore not surprising. Prompt surgical treatment is urgently indicated in all retinal detachments that are not due to neoplasm or inflammation, and if degenerative changes have not made surgical risks prohibitive. Chas. A. Bahn.

12

OPTIC NERVE AND CHIASM

Bruetsch, W. L. **Unilateral syphilitic primary atrophy of the optic nerves: an anatomic study of two cases.** Arch. Ophth. **30**:80-91, Jan., 1948.

Syphilitic optochiasmatic arachnoiditis, which is frequently present in neurosyphilis, has nothing to do with the causation of the atrophy of the optic nerves. The most efficacious treatment of syphilitic optic nerve atrophy is malarial therapy, aided by concomitant and subsequent courses of penicillin, each course consisting of the administration of at least 5,000,000 units. (3 figures, 2 case histories, 8 references.) R. W. Danielson.

Esposito, A. C. **Tryparsamide optic atrophy.** West Virginia M.J. **44,** Feb., 1948.

Tryparsamide exhibits a toxic affinity for the optic nerve and its use in central

nervous system syphilis should be controlled by frequent detailed examination of the visual fields, central vision and fundi. The patient should be cautioned as to the symptoms of toxicity. At the first signs of damage tryparsamide should be immediately and permanently discontinued and other measures should be instituted. F. H. Haessler.

Hess, Leo. **Atrophy of the optic nerve associated with tabes dorsalis and with glaucoma.** Arch. Ophth. **38**:199-220, Aug., 1947.

It is suggested that the atrophy of the optic nerve in tabes begins behind the bulbus, somewhere in the optic pathways, producing secondary degeneration along the optic nerve and the optic tract as far as, and including, the lateral geniculate body. A congenital or acquired anomaly of the spinal cord may predispose a patient to the development of tabes. It is fair to assume that an analogous irregularity in the structure of the optic nerve and optic tract may account for the variety of the visual defects associated with tabetic atrophy of the optic nerve. Evidence, including clinical cases, is presented to show that tabes dorsalis is not merely a disease of the spinal cord but may involve the diencephalon. The author also demonstrates that definite characteristics of body build and growth are clinically noticeable in tabetic persons with atrophy of the optic nerve, demonstrating an endogenous alteration of the diencephalic area. The above implies that syphilis is the precipitating, not the causative, agent in tabes and tabetic optic atrophy.

Like the primary atrophy of the optic nerve in certain cases of tabes dorsalis, "glaucomatous" atrophy of the optic nerve may be connected with a congenital anomaly of the diencephalic area. Atrophy of the optic nerve is prone to develop either in persons with asthenia associated with acromegaloid features or in those with a pyknic body build associated with signs of adiposogenital disturbance.

John C. Long.

Kaminskaia-Pavlova, Z. **The role of the premorbid state in the beginning of ocular fundus changes after cranial trauma.** Semana Méd. **15**:223-225, Feb. 5, 1948.

The author cites four cases of trifling trauma in which she thinks there might be good reasons to suppose that the injury had stirred up previously existing pathologic conditions so as to produce visual deterioration.

The first patient, a man, aged 42 years, sustained a slight blow on the head, and began to complain of nausea and reduced vision. Examination showed descending atrophy of the optic nerve, and the patient had other evidence of tabes. The second patient, said to have been a sharpshooter, suffered a cerebral contusion, with progressive loss of vision. The third patient was a woman of 45 years who had general vascular hypertension and had struck her head in a fall. She underwent spells of loss of consciousness, showed hemorrhages of the eye-grounds, and then some failing of vision, although the latter had previously been normal. The fourth patient was a man of 30 years who suffered reduction of vision after cranial trauma during a bombardment. He had a descending atrophy.

The author does not offer any analysis as to the validity of the previous histories of the patients as related to spurious claims concerning the causes of loss of vision. W. H. Crisp.

13

NEURO-OPHTHALMOLOGY

Bender, M. B., and Teuber, H. L. **Spatial organization of visual perception following injury to the brain.** Arch.

Neurol. and Psychiat. **58**:721-739, Dec., 1947.

The authors discuss the problem as it hitherto had been studied, and concluded that the approach often was general and uncritical. They describe two of 12 cases, which were characterized by a specific disability to localize objects in a limited portion of the field of vision. They examined for reduced visual function, visual perception of spatial relations, and intellectual functions pertinent to generalized orientation in space. There is a complete report of the case of a 22-year-old Marine officer with a shrapnel wound in the region of the right motor cortex. (References.) Bennett W. Muir.

Cogan, D. G. **Neurologic significance of lateral conjugate deviation of the eyes on forced closure of the lids.** Arch. Ophth. **39**:37-42, Jan., 1948.

This paper evaluates a diagnostic sign, a variant of Bell's phenomenon, which consists of a lateral conjugate deviation of the eyes on forced closure of the lids. It occurs in persons with intracranial disease.

Cogan finds that this sign is relatively infrequent in persons with no known neurologic disease. Of the present series of 156 persons, it occurred in only 3. With unilateral cerebral disease, a lateral conjugate deviation of the eyes with closure of the lids does occur in a significantly large percentage of patients. It was present in more than one-half of the present series. The deviation is characteristically to the side opposite the lesion (that is, to the side of the hemiplegia and hemianopsia). It occurs with lesions in the anterior or the posterior part of the hemisphere. However, with presumably unilateral lesions of the cerebellum, brain stem or labyrinth, the deviation of the eyes with closure of the lids was not significantly more frequent to one side than to the other.

As a cognate sign of unilateral cerebral disease, deviation of the eyes on closure of the lids supplements, but does not replace, other signs. It may be present or absent when there is, or is not, gross paresis of conjugate gaze. Similarly, it may be present or absent with or without disturbances of the opticokinetic response, and with or without hemiplegic or hemianopic disturbances. (5 references.)

R. W. Danielson.

Javett, S. N., and Samuel, E. **Tumor of the optic chiasma.** Arch. Dis. Child. **22**: 248-250, Dec., 1947.

A five-year-old boy had slight frontal headache for two months preceding the discovery of defective vision of the right eye with retention of only some of the temporal field. He had bilateral atrophy of the disc greater in the right eye. Eight hours after lumbar puncture the patient had a severe pain in the back and the right hip, followed by headache and vomiting. X-ray films showed a characteristic enlargement of the anterior part of the sella turcica with excavation of the under surfaces of both anterior clinoid processes and with increased size of the optic foramina, greater on the right side. A diagnosis of chiasmal glioma was made, and surgery done. After the optic nerve had been stripped, a large tumefaction about the size of a pigeon's egg was encountered. It was continuous with the chiasma and extended backward along the optic tracts. Removal of this lesion would have been technically impossible or nearly so. Chiasmal glioma is essentially a condition of childhood. Growth is slow and may not lead to death for many years. The visual effect is bizarre. In the differential diagnosis one must consider craniopharyngioma, pituitary tumor, aneurysm of the

circle of Willis, suprasellar meningioma, and chiasmal arachnoiditis with cyst formation. (6 figures, references.)

Bennett W. Muir.

Puglisi-Duranti, G. **Treatment of neurolues and particularly of tabetic opticoneuritis and neuro-ophthalmic affections.** Riv. oto-neuro-oftal. **22**:179-221, May-June, 1947.

The writer reports 21 cases of neurosyphilis in men from 25 to 43 years of age. There were 2 cases of tabetic optic atrophy, 2 of postneuritic optic atrophy, 2 of retrobulbar neuritis, 5 of optic neuritis, 2 third nerve paralysis and 4 of paralysis of the seventh nerve. Chemiotherapy was associated with the simple rachicentesis or subarachnoid injection of air, phenolsulphonphthalein or even arsenic. In almost all cases the treatment was followed by a rapid improvement of the symptoms, a shortening of the duration of the disease and in some cases by the recovery. The meningeal reaction to the subarachnoid injection was never intense. (Bibliography.)

Melchoire Lombardo.

Matteucci, P. **Congenital nystagmus and spasmus nutans with unusual vertical dissociation in an individual with normal visual and vestibular apparatus.** Boll. d'ocul. **26**:317-331, May, 1947.

In an eight-year-old boy an odd posture of the head was noted since early life. The head was tilted forward and exhibited slight rotary movements that were not synchronous with the nystagmus present and continued at all times except during sleep. The eyes, with visual acuity of 9/10, emmetropia, binocular fusion and three diopters of exophoria, presented a horizontal-rotary type of nystagmus with a balance-like vertical component which was characterized by elevation of one eye when the other was depressed. Elevation and depression of the eyes were accompanied by lid elevation and drooping and both were irregular in extent and frequency. The frequency of the vertical movements was less than that of the horizontal-rotary nystagmus which occurred about 50 to 70 times a minute. There was no history of severe infection and the parents and seven siblings were healthy. The discussion of the unique observation is inconclusive. Poetzl and Sittig described similar movements in the Hertwig-Magendie syndrome and related them to a lesion in the posterior longitudinal fasciculus. On the other hand one might assume that the spasmus nutans and nystagmus are congenital and the vertical dissociation of the latter could be ascribed to a more recent process, possibly multiple sclerosis. (Bibliography.)

K. W. Ascher.

14

EYEBALL, ORBIT, SINUSES

De Voe, A. G. **Repair of orbital deformities with glass wool.** Arch. Ophth. **38**:245-247, Aug., 1947.

Depressed fractures of the orbital floor are frequently associated with traumatic enophthalmos. A similar type of cosmetic defect in the position of the lids may be seen following some uncomplicated enucleations in which there has been atrophy of the orbital fat. Both types of defect may be remedied by the subperiosteal insertion of inert material in the floor of the orbit so as to restore the orbital volume to its original mass. Many materials have been so used. These include autogenous and preserved cartilage, autogenous and preserved fascia lata, bone, tantalum wool, plates, ribbon and acrylic plates.

Glass wool, known as "fiberglas," has been found to be an excellent material for the subperiosteal insertion. It is nonabsorbent, is not affected by tissue fluids, does not produce toxins, is not susceptible to attack by bacteria and is not considered carcinogenic.

John C. Long.

Diaz Gómez, E., and Marín Amat, M. **Two cases of pseudo-tumors of the orbit, one of the inflammatory type and the other of a hydatid cyst. Treatment.** Arch. Soc. oftal. hispano-am. 7:899-908, Sept., 1947.

Two cases of pseudotumor of the orbit are reported. From the clinical standpoint a diagnosis of neoplasm of the orbit was made in both. A 45-year-old woman had developed an almond-sized painless mass in the right orbit at the superior external angle during the previous year. Exophthalmos. edema and ptosis of the right upper lid were noted. Ocular movements were limited in all directions. Upon exploration, an encapsulated mass of inflammatory tissue was removed from the orbit, which also contained glandular tissue from the lacrimal gland. The second patient, a 16-year-old girl, had had an irreductible, painless exophthalmos of the left eye for three months, with ptosis of the left upper lid and limitation of the ocular movements. Visual acuity was almost nil. Upon exploration, liquid was found in the superior part of the orbit which was enclosed in a hydatid membrane. Recovery was uneventful in both cases. J. Wesley McKinney.

Hughes, W. L. **Integrated implants and artificial eyes for use after enucleation and evisceration.** Am. J. Ophth. 31:303-310, March, 1948. (6 figures, 3 references.)

Naffziger, H. C. **Exophthalmos. Some principles of surgical management from the neurosurgical aspect.** Am. J. Surg. 75:25-41, Jan., 1948.

Unilateral exophthalmos necessitates a diagnosis of the type of lesion and its location. Is it orbital, intracranial, or both? Where the protrusion is bilateral the lesion is not removable and decompression is indicated. With normal bulbar extension of 11 to 20 mm. on the exophalmometer it is not always possible to say that a state of abnormal protrusion is present. By looking down on the cornea from above and comparing the positions relative to the superior orbital margin one can determine a difference in the relative positions of the bulbs. Unilateral protrusion suggests a tumor. With the latter a difference of 5 or 6 mm. on the exophthalmometer is usually seen. Goiter, aneurysm, cavernous sinus thrombosis, and mucocele have caused unilateral exophthalmos. Lesions on one side, confined to the anterior part of the orbit should be treated by the ophthalmic surgeon. The anterior route is the operative approach. Reese, Davis, and Benedict have described suitable procedures the choice of which depends upon the location of the lesion.

As early as 1915 the author produced bilateral decompression by a transcranial but extradural route. Visual improvement resulted where bilateral exophthalmos, from general causes, existed.

The experiences gained by such wide orbital exposure has helped when applied to patients with unilateral tumors, for the technique is the same.

Anterior pituitary injections in animals have shown that the increase in orbital content is dependent upon hormonal and constitutional disturbances. Exophthalmometer readings in those requiring surgery have ranged from 22 to 35 mm. About 16 is the average normal.

In thyrotoxicosis decompression should not be delayed too long; the most important surgical indication in this type of exophthalmos is diminishing vision. When decompression is required, the wider the bone removed the better the result. Krönlein and other restricted procedures are very unsatisfactory.

The surgical procedure employed by the author is described in detail. Frontal bone flaps, smaller than originally, are used and the dura is peeled from the or-

bital plate. Removal of bone from the orbit and incision of the annulus of Zinn, where necessary, complete the important steps in the operation. Postoperative progress is described in detail. Bulbar pulsation is easily seen, protrusion is lessened quickly but returns to some degree temporarily. The choked disc disappears quickly without unroofing the optic foramina. The operation for unilateral intraorbital tumors varies but little from this transcranial extradural operation. Other methods of decompression are referred to in brief. Francis M. Crage.

15

EYELIDS, LACRIMAL APPARATUS

Agnello, F. **Palpebral ephidrosis in the light of modern theories on pathology of the sympathetic system.** Riv. oto-neuro-oftal. **22**:222-228, May-June, 1947.

A boy, 15 years of age, complained of continuous lacrimation of both eyes with burning sensation and itching of the lids. The lids showed hyperchromic spots near the orbitopalpebral fold and looked as though covered by water. Injections of atropine gave only temporary relief. The writer suggests that the lesion is probably a result of a disfunction of sympathetic innervation. Melchiore Lombardo.

Armstrong, C. J., and Garcia, F. A. **The use of a composite graft in reconstructive surgery of the lower eyelid.** Plastic and Reconstructive Surg. **3**:79-83, Jan., 1947.

Brown and Cannon have used a composite graft from the helix of the ear for nasal reconstruction, and the authors applied this technic to reconstruction of the lower eyelid in four cases. Under local anesthesia all cicatricial tissue removed, the lid margin is straightened and the complete defect is exposed. A pattern of it is mapped out on the aural crus. Then the composite graft is cut with a no. 11 Bard-Parker blade, which cuts through all layers. Interrupted sutures (6-0 silk) are used along both edges to hold the graft in place. One arm of each suture is left long to tie over a vaseline gauze-cotton stent. The donor area is closed without formation of a defect.

The skin on the orbital side of the graft is tailored or removed so that the conjunctiva is used to its fullest extent. If a normally functioning eyeball is present, the skin on the ocular surface of the grafts should be replaced with an oral mucous membrane graft at a secondary stage. (11 photographs.) Alston Callahan.

Fox, S. A. **Some methods of lid repair and reconstruction. V. Displacement of the canthi.** Am. J. Ophth. **31**:317-322, March, 1948. (6 figures, 3 references.)

Mohs, F. E. **Chemosurgical treatment of cancer of the eyelid: a microscopically controlled method of excision.** Arch. Ophth. **39**:43-59, Jan., 1948.

In the chemosurgical treatment of cancer of the eyelid, as in the treatment of cancer in other sites, the microscopic control is accomplished by means of a process consisting of the following steps: (1) in situ chemical fixation of the tissues suspected of being cancerous by means of a zinc chloride paste; (2) excision of a layer of the fixed tissue; (3) location of the cancerous areas by systematic microscopic examination of the excised tissues; (4) further chemical treatment of the areas demonstrated to be cancerous, and (5) repetition of the process until the cancer, including all its irregular extensions, has been entirely excised.

The chief advantage of the chemosurgical treatment of cancer of the eyelid is the microscopic control of excision afforded by the method. The reliability of the method is attested by the high rates of cure. (15 figures, 6 tables, 8 references.) R. W. Danielson.

Sugar, H. S., and Forestner, H. J. **Plastic implant for sunken lid.** Illinois M. J. **92**:219-224, 1947.

A methyl methacrylate implant (27 to 30 mm. in length and 5 to 8 mm. in width) was inserted beneath the orbicularis muscle in 20 patients. Satisfactory cosmetic results were obtained in all. (6 figures.) Irwin E. Gaynon.

Walser, Erwin. **Nida's ptosis operation.** Arch. f. Ophth. **148**:129-138, 1947.

Fifteen operations were performed. The results were very satisfactory. The author describes the procedure quoting from Nida (Bull. Soc. Ophthalm. Paris 1928. No. 9, 566): "A narrow tarso-conjunctival strip is pulled through underneath the tendon of the superior rectus. The strip is taken from the margin of the tarsus. The free end of the strip is stitched to the underlying tissue near the site of its origin." E. Schmerl.

16
TUMORS

François, Jules. **Intraocular Schwanoma.** Ann. d'ocul. **180**:542-545, Sept., 1947.

Schwanoma or neurinoma, is a tumor which originates in the sheath of Schwann in the cerebro-spinal nerves. Pathologically, its lesions are identical with those in von Recklinghausen's disease. Cell nuclei are small, elongated or truncated at the ends; the protoplasm is reticular or fibrillar and usually elongated. Although not usually malignant it is potentially so, beginning in meningoblasts or nevus cells. Retinal Schwanoma occurs mostly in the young.

In the case reported, a 44-year-old woman with von Recklinghausen's disease had observed visual failure in one eye one month previously. The eye was totally blind when examined. The retina was detached and a large mass was observed in the periphery. The eye was enucleated, with a tentative diagnosis of melanotic choroidal sarcoma. Sections were characteristic of Schwanoma, the site of which depends upon the location of the ciliary nerves. Chas. A. Bahn.

Miller, D., and Bowling, J. L. **Orbital hydatid.** Brit. J. Surg. **35**:211-212, Oct., 1947.

A case of orbital hydatid is presented. The patient, a female white child aged 4½ years, complained of poor vision in the left eye. There was a marked exophthalmos, the cornea was directed downward, the nerve head swollen, and the superior rectus paretic. The vision was reduced to counting fingers.

After raising a frontal osteoplastic flap, the frontal lobe was retracted and the orbital plate removed. Under the orbital fascia and fat a glistening cyst was found. After aspiration of clear fluid it was removed in toto. There was a return to normal but the vision was not mentioned.

The cyst wall revealed a typical hydatid membrane. The literature and five other reported cases are briefly described. Francis M. Crage.

Wolff, Eugene. **The origin of the malignant melanomata.** Brit. J. Ophth. **32**:72-82, Feb., 1948.

In a carefully prepared article the author reviews the literature and points out the important contributions that have been made regarding the origin of the malignant melanomata. He believes that these tumors do not arise from a single cell type. Malignant melanomata are known to arise from branched chromatophores, proliferation of surface epithelium and nevus cells (of neurogenic origin, since nevus cells are developed from the end apparatus of the sensory nerves). The nevus should be regarded as a composite of these three types of cells; each may proliferate alone or with the others pro-

ducing a malignant pigmented tumor, the final structure of which depends upon the relative proportions of the three types of cells. (7 photomicrographs.)

O. H. Ellis.

17

INJURIES

Amendola, Francisco. **Ocular manifestations of foliaceous pemphigus.** Arq. brazil. de Oftal. **10**:105-119, 1947.

This paper to be published later in the American Journal of Ophthalmology.

W. H. Crisp.

Doppel, H. **Iron splinter, healed in iris, removed after 37 years.** Proc. Ophth. Soc. Vienna p. 10, April 27, 1942.

In a man, 42 years of age, showing signs of endophthalmitis with hypopyon, a foreign body could be demonstrated in the iris near the pupillary margin directly and with X-ray. Uneventful recovery followed removal of the splinter. F. Nelson.

MacRae, Alex. **Injuries to the eyeball excluding intraocular foreign bodies.** Tr. Ophth. Soc. U. Kingdom **65**:305-317, 1945.

The author reports 5178 patients with eye injuries who came to the Eye Hospital in Newcastle in 1943, and 113 of them, or 2.2 percent, were serious enough to require admission. The total time lost to industry with these injuries was 17.4 years. Among patients with nonpenetrating injuries were some with hypopyon ulcers, vitreous opacities and dendriform ulcers. Beulah Cushman.

McLaughlin, R. S. **Chemical burns of the human cornea.** Tr. Am. Acad. Ophth. pp. 112-114, Nov.-Dec., 1947.

Employees who are subject to ocular burns should be trained in their emergency treatment. First aid should be with tap water from a faucet, bucket, or a hose. Attempts at chemical neutralization should be postponed until later and when the chemical action is understood. After emergency irrigation the treatment may include the instillation of 0.5 percent pontocaine, irrigation with a siphon of saline, and the removal of foreign matter, preferably with cotton swabs, chemical analysis of the offending substance, staining with fluorescein, a second washing, and restaining. Diseased epithelium is then removed with cotton swabs under the biomicroscope. Final irrigation with stainless merthiolate and instillation of sulfathiazole ointment is followed by closing of the eye with a cover. Patients with local or general evidences of infection are hospitalized. Potentially permanent corneal opacities are treated with 0.5 percent solution of choline chloride instillations, four or five times daily. Sorsby's amniotic membrane grafts are advised in all deep corneal and conjunctival burns. In 800 consecutive cases reported, permanent corneal opacities occurred in less than two percent.

Chas. A. Bahn.

Rudd, Charles. **Injuries to the eyeball excluding intraocular foreign bodies.** Tr. Ophth. Soc. U. Kingdom. **65**:318-327, 1945.

One hundred cases of perforating injury were reviewed. Enucleation was necessary in 25 patients. There was one case of sympathetic ophthalmia in which vision of both eyes was lost. Suppuration occurred in seven eyes.

Beulah Cushman.

Uhde, G. I. **Eye injuries from so-called noncasualty war gasses. Report of cases.** Am. J. Ophth. **31**:323-327, March, 1948. (4 figures, 9 references.)

18

SYSTEMIC DISEASE AND PARASITES

Tassman, I. S. **Ocular changes in the metabolic diseases.** Virginia M. Monthly **75**:70-74, Feb., 1948.

The main portion of this article deals with the ocular changes related to dia-

betes. After a brief consideration of the relationship between the autonomic nervous system and the endocrine glands, the author describes the ocular picture produced by sympathetic hyperfunction and hypofunction. The former is characterized by proptosis, widened palpebral fissure, and tearing, with dilated pupil and the latter is manifest as Horner's syndrome. The author discusses briefly the Laurence-Moon-Biedl syndrome, in association with pituitary hypofunction.

In diabetes, there is no correlation between blood sugar level and the appearance of retinal hemorrhages, but there is a correlation between blood sugar level and transient changes in refraction, accommodation, and vision. Oculomotor pareses occur in diabetes. Rubeosis of the iris is described. The retinal changes are predominantly hard yellow exudates, sometimes in circinate arrangement, deep retinal hemorrhage, preretinal hemorrhage and sometimes retinitis proliferans. They depend on the duration of the diabetes rather than its severity. The hemorrhages are probably not on an atheromatous basis. The retinal picture may be altered by coexistent diseases, such as nephritis or hypertension. However, even under these circumstances one may still recognize the underlying characteristic features of diabetic retinosis. The author, with Friedenwald, associates these retinal hemorrhages with increased capillary frigility. Benjamin Milder.

Valdecasas, Pedro. **Ocular myiasis.** Arch. Soc. oft. hispano.-am. **7**:909-911, Sept., 1947.

A 15-year-old boy had external ophthalmomyiasis, the larvae of the genus Oestrus ovis were found in the bulbar conjunctiva. J. Wesley McKinney.

19

CONGENITAL DEFORMITIES, HEREDITY

Lisman, J. V. **Oxycephaly with optic atrophy. Report on results of the King operation.** Am. J. Ophth. **31**:311-317, March, 1948. (8 figures, 12 references.)

Stephens, F. E. **Case of sex-linked microphthalmia.** J. Heredity **38**:307-310, Oct., 1947.

Cases of microphthalmia occurring only in males in four different generations of a Utah family are reported. The inheritance seems to be recessive and sex-linked Irwin E. Gaynon.

20

HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Cogan, D. G. **Students' model for demonstration of action of the extraocular muscles.** Arch. Ophth. **39**:92-93, Jan., 1948.

The author describes a model eye made from a golf ball. Screws are placed at the muscle insertions and strings are tied to them. By pulling the strings, one can visualize the action of each muscle in any position of the eye. (1 reference, 1 diagram.) R. W. Danielson.

Crisp, W. H. **Early development of the filtration operations for glaucoma.** Am. J. Ophth. **31**:277-285, March, 1948. (29 references.)

Fishbein, M. **Medical leadership and education.** Tr. Am. Acad. Ophth. pp. 98-106, Nov.-Dec., 1947.

Medical education, medical leadership and the public health are closely alligned and parallel. They can no more be normally separated than can the marrow and nerves in the bone. The destructions and dislocations of war only temporarily change these relationships. The history of the American Medical Association parallels that of medical education and the public health. Progress in the reduction of infectious diseases is shown by the decreased prominence and second place which typhoid and similiar diseases now

occupy in text-books as compared with only one generation ago.

A recent visit by the author to our Latin neighbors further illustrates these facts. In the United States, tuberculosis is the seventh cause of death with a rate of approximately 42 to 100,000 population; in several South American countries, its death rate is approximately 400 per 100,000. In Chile, 400 of every 1000 babies born die before their first birthday.

In evaluating our medical progress in this, the last bulwark of democratic medicine, comparative methods illustrate the importance especially of preventive medicine. In our medical schools the average class varies between 40 and 100; while in Cuba, one first year class had 1200 students. Adequate medical facilities, equipment, teachers, and discipline are woefully lacking in many Latin American countries. Graded and orderly advancement in training, internships, residencies, as well as the control of specialties, hospitals and nurses are practically nonexistent. The recognition of specialists by boards of certification is unique in this country as are special associations for clinical and study groups. Occasionally, some highly advanced specialist rises above the general sub-standard and accomplishes much, but the general level of medical leadership, education and public health is lamentably low. Disease, like crime, doesn't pay. Death, sickness and deficiency are bed fellows in both.

Of all God's creatures, physicians have the most prolonged infancy. The price of leadership, especially medical, is high and rightly so. The real medical leader of today and especially of tomorrow must first have a deep understanding of the natures of men. He must always and in all ways be steadfast and fair and, just as important, he must be brimful of moral and professional honesty. He must be public-minded and above pettiness, giving without ulterior motives generously of his time and efforts for the good of all.

Investigation has shown that we doctors are not the invariable suckers which we are pictured and generally believed to be. Strange as it seems, ophthalmologists over a period of years have not done badly for themselves economically.

The only free and independent medical profession left in the world is in the United States. To preserve it, bureaucracy and government domination with its stupidities and inefficiencies must be fought every day and in every way by all of us. Now the trend is fortunately away from the governmental domination of medical practice and the medical profession. Your Academy is and has been a material contributor to the quantity and quality of medical leadership, education and the public health. Chas. A. Bahn.

Foster, John. **An oculist in Switzerland.** Brit. J. Ophth. **32**:83-111, Feb., 1948.

This is a travelogue of visits to many Swiss ophthalmological centers. It is written so engagingly and refers to such a wealth of interesting work that one is not only moved to admiration of Swiss ophthalmology but is tempted to go see for oneself. O. H. Ellis.

Fiedenwald, J. S. **Standardization of tonometers.** South. M. J. **41**:44-47, Jan., 1948.

The data and recordings from instruments made according to the specifications of Schiøtz have been generally accepted as reliable. However, due to differences in manufacturing, many instruments vary widely from the desirable standards. This led to the establishment by the American Academy of Ophthalmology and Otolaryngology of a committee on standardization of tonometers. Three checking stations are now in operation, the charge for each instrument checked is $5.00. All American manufacturers have now agreed to produce

instruments which conform to the standards that are considered essential. All instruments are independently tested by the Electrical Testing Laboratories, Inc., New York, and those passing are certified. (References.) Bennett W. Muir.

McCoy, D. A. **Experiences in industrial eye problems.** Tr. Am. Acad. Ophth. pp. 107-114, Nov.-Dec., 1947.

The 45 million industrial employees in the United States all potentially need industrial ophthalmic service. This should include pre-placement examination for the job, as well as periodic and diagnostic examinations and treatment for all eye injuries and diseases. Twenty percent of all employees are visually handicapped for their specific jobs. The approximately one thousand eye injuries which occur daily cost in medical care and compensation alone over one billion dollars yearly. The importance of preventive and industrial ophthalmology is illustrated in the epidemic of industrial keratoconjunctivitis which occurred in 1942. Soon after efficient treatment was instituted and transmission through unsanitary practices was reduced, the disease practically ceased to exist.

In industrial ophthalmology, the most difficult problems involve the inability or unwillingness of individuals to use reasonable precautions. The magnitude of industrial ophthalmology necessitates optometric assistance but the primary responsibility for screening and other examinations as well as leadership should be in ophthalmic hands. Greater standardization of eye examinations is needed as is greater efficiency in first aid treatment. United and concerted policy and action of management, labor, and insurance companies are badly needed. Even slight differences are harmful to all concerned. Ophthalmology and ophthalmologists have unfortunately drawn away from industrial ophthalmology in the past, apparently because of its slightly different techniques and standards. Industrial medicine and surgery, including ophthalmic, should be taught in all undergraduate medical schools. Chas. A. Bahn.

Minton, Joseph. **Vision and the selection of personnel in industry.** Tr. Ophth. Soc. U. Kingdom. **65**:211-218, 1945.

The author recommends that all individuals whose vision is less than 6/12 in each eye be referred for an ophthalmological examination and that the standards of vision should not be rigid, but vary according to the analysis of the job.

He suggests that five visual groups are possible among the workers and describes the visual acuity and the characteristics of the work in each. Special visual problems are presented in the selection and allocation of jobs to juveniles, those with myopia, and for fine, close work.

Beulah Cushman.

Payne, B. F. **Aviation Ophthalmology.** Jour. Aviation Med. **18**:367-378, Aug., 1947.

Aviation ophthalmology is concerned with the visual standards for personnel engaged in flying and maintaining aircraft. The examination is concerned with visual acuity, depth perception, color testing, extraocular muscle balance, and the discovery and elimination of disease in the external or internal portions of the eye. An outline of the course in ophthalmology at the AAF School of Aviation Medicine is given.

Irwin E. Gaynon.

Rennie, T. A. D. **General aspects.** Harrington, D. O. **Ophthalmology. Psychosomatic manifestations.** Tr. Am. Acad. Ophth. pp. 65-74, pp. 78-89, Nov.-Dec., 1947.

This symposium should be read by every ophthalmologist. Its parts are so closely alligned that a composite abstract is advisable.

Only psychosomatic ophthalmology is good ophthalmology because it, alone, is comprehensive ophthalmology. Among the general diseases with important psychosomatic ophthalmic manifestations are diabetes, hypertension and hyperthyroidism. The sensory stimuli which begin in the retina play an especially important part in physical and mental activities and inactivities, both quantitatively and qualitatively. Therefore, the mental processes of sight are vitally involved in psychosomatic sickness, in which anxiety is always involved. There is nothing to which one will not resort to escape the discomforts of prolonged anxiety when it becomes intolerable. The most frequent escape mechanisms include numerous patterns of mental conversions and/or vegetative psychoneuroses. The former includes blepharospasm, convergence spasm, asthenopia, photophobia, hysterical amblyopias, and amauroses; the latter ciliary spasm, transient amblyopias, angiospastic retinopathies, migraine and glaucoma.

Limited space precludes even a brief discussion of the many important concepts presented. My paraphrasing of a few of its more provocative ideas will, I hope, stimulate the readers' interest. The first function of all physicians is to honestly and intelligently care for the human beings who have sickness. Psychosomatic ophthalmology is not veterinary ophthalmology, because only human beings can express in the spoken and written word the link that connects symptoms with their complete causation. The eyes have been closely associated with both sight and understanding since the beginning of history in all phases of human activity. All psychosomatic sickness is an expression of anxiety and its effects. Their manifestations are expressed positively and not negatively to those who can and will see. The proponents of psychosomatic ophthalmology have been damned with faint praise. Those who have professed to cure symptoms of psychosomatic sickness both within and without our profession have probably aggravated more neuroses than they have cured. There would be fewer unsuccessful operations or blind and unhappy patients, if more ophthalmologists would practice more psychosomatic ophthalmology. Words are to the practitioner of psychosmatic ophthalmology what ophthalmoscopes are to physical opthalmologists. Chas. A. Bahn.

PAN-AMERICAN NOTES

Edited by M. URIBE TRONCOSO, M.D.
500 West End Avenue, New York
Communications should reach the editor by the 12th of the month

III PAN-AMERICAN CONGRESS

This Congress convened at Havana, Cuba, from January 3 to 10, 1948, with great success and a larger attendance than at any of the previous meetings in Cleveland, Ohio, and in Montevideo, Uruguay. Although Dr. Vail has already reported in the editorial section on the principal features, excellent organization of the meetings, and on the scientific and commercial exhibitions, it may be pertinent to emphasize some other results obtained by the Congress.

Although a greater number of ophthalmologists were present from the United States, nearly one half of the total came from the Latin-American countries. Not only the big nations on the continent sent delegates, but even the smaller countries in Central America had several representatives. I met colleagues from Guatemala down to Costa Rica. Mexico had a big delegation with about 12 members; Brazil had nearly 20 members, with Argentina and Chile following in numbers. Three ophthalmologists came from Uruguay. Paraguay, Peru, and Bolivia were also well represented. Cuba, the host of the Congress, had numerous official members who vied with each other in helping the colleagues who had difficulties with lodgings, language, or with traveling after the Congress was finished.

Latin-American members showed a great spirit of comradeship between themselves and made friends with physicians of other Spanish- or Portuguese-speaking countries. The English-speaking ophthalmologists also made numerous acquaintances with Latin physicians and a true international atmosphere prevailed.

The many courses of instruction were a new departure greatly appreciated by all members. Some courses were given in Spanish, although the majority were in English. All had many attentive listeners.

The entertainments provided by the Congress were all splendid and enthusiastically attended. The last one, in the Cathedral Square, the final day of the Congress, was particularly brilliant. The mild climate allowed the ladies and members to remain outdoors in evening attire and dance until the early hours of morning. There were many couples in costumes from different countries and Cuban performers gave special exhibitions.

The next Congress should convene in 1950, but is delayed until 1952 because of the meeting in London that year of the 15th International Congress of Ophthalmology. The next Pan-American reunion will be held in Mexico City in 1952.

Dr. Harry S. Gradle was honored in absentia with the first Pan-American Medal of the National Society for the Prevention of Blindness for his services in establishing friendly relations with the Latin-American countries.

New officers elected for the Pan-American Ophthalmological Society were Dr. C. Berens, president; Dr. W. L. Benedict, vice-president; Dr. Thomas D. Allen, secretary; and Dr. Derrick Vail, secretary for instructional courses.

SOCIETIES

MEXICAN OPHTHALMOLOGICAL SOCIETY

The board of directors of the society for 1948-1949 has been changed as follows: president, Dr. Lino Vergara Espino; vice-president, Dr. F. Martinez Hinojosa; secretary, Dr. Raul A. Chavira; annual secretary, Dr. J. Antonio Quiroz; treasurer, Dr. F. Palomino Dena.

NATIONAL CONGRESS IN MEXICO

The Mexican Society of Ophthalmology has initiated and will organize the meeting of the National Congress to be held in Mexico City in the second week of January, 1949.

SOCIETY OF SÃO PAULO, BRAZIL

This society elected new members for the board of directors for the period 1947-1948 as follows: president, Dr. Benedito Paula Santos Filho; vice-president, Dr. Plinio Toledo Piza; executive secretary, Dr. Paulo Braga Bagalhães; secretary, Dr. Rubens Belfort Mattos; archives, Dr. Alcides Del Ciello; treasurer, Dr. Aureliano Fonseca.

SOCIETY OF GUADALAJARA, MEXICO

Guadalajara is the second city in population in Mexico. The ophthalmologists practicing there have formed a new Society of Ophthalmology with the following board of directors: Dr. Elias Mendoza Gonzalez, president; Dr. Manuel Romo, vice-president; Dr. L. Nunez Leal, secretary; Dr. Antonio Diaz Guerrero, treasurer. Dr. Enrique Avalos, Sr., was appointed honorary president.

PERSONALS

Dr. H. Arruga, the well-known surgeon from Barcelona, Spain, after attending the Pan-American Congress of Ophthalmology in Havana, came to New York to renew old acquaintances in the city and to supervise the translation into English of his book on ocular surgery which has received so many laudatory comments.

Dr. Karl Lindner and Dr. Adalbert Fuchs of Vienna, Austria, came to the United States after attending the congress in Havana. Dr. Lindner gave lectures at the New York Academy of Medicine and

at the St. Louis Ophthalmic Society and Dr. Fuchs lectured at Gill Memorial Eye, Ear and Throat Hospital in Roanoke, Virginia.

Dr. Algernon B. Reese has just returned from Mexico where he gave a series of lectures on "Tumors of the Eye."

NEWS ITEMS

Edited by DONALD J. LYLE, M.D.
904 Carew Tower, Cincinnati 2
News items should reach the editor by the 12th of the month

DEATHS

Dr. Willis Orville Nance, Chicago, Illinois, died January 16, 1947, aged 76 years.

Dr. Elias Selinger, Chicago, Illinois, died December 21, 1947, aged 49 years.

ANNOUNCEMENTS

ACADEMY HOME STUDY COURSE

The home study courses, sponsored by the American Academy of Ophthalmology and Otolaryngology, in the basic sciences related to these two specialties, will be given again, beginning September 1, 1948. Registrations must be completed before August 15. Detailed information may be obtained from Dr. William L. Benedict, executive secretary, 100 First Avenue Building, Rochester, Minnesota.

JACKSON'S "SKIASCOPY"

About 25 copies of Dr. Edward Jackson's 120-page volume on "Skiascopy" are still available for distribution, and a copy will be sent without charge to each of those ophthalmologists first addressing a request to receive one to Dr. William H. Crisp, 1276 Emerson Street, Denver 3, Colorado.

There will probably be several months delay in complying with these requests, since Dr. Crisp will be out of the United States from a little after the middle of May until the latter part of September, and will not be represented by an office secretary during his absence.

MISCELLANEOUS

ITALIAN JOURNAL CHANGE

The Italian *Rivista di Oftalmologia,* beginning in January, 1947, under the editorship of Prof. B. Alajmo and published by L. Salpietra is being continued by Dr. B. Alajmo and the same group of collaborators as the *Giornale Italiano di Oftalmologia* under the management of the Clinica Oculistica of the Universitaria of Florence, Italy. The journal will be published every two months. Volume 1, number 1, January-February, 1948, has already been received in this country.

UNIVERSITY OF MICHIGAN CONFERENCE

On May 6th to 8th, an ophthalmology conference was held at the University of Michigan. The first day's program included: "Applied Physiologic Optics," Charles Sheard, Ph.D.; "Toxoplasmosis," Dr. Raymond L. Pfeiffer; "Anomalies and Diseases of the Optic Nerve," Dr. Winsor S. Davies; a fundus clinic at the Wayne County General Hospital; and a joint meeting with the Detroit Ophthalmological Society and Club and the Michigan Triological Society.

The program for the second day was: "Applied Physiologic Optics," Charles Sheard, Ph.D.; "The Roentgenographic Diagnosis of Retinoblastoma," and "Roentgenography of Exophthalmos," Dr. Raymond L. Pfeiffer; "Modern Trends in Ophthalmic Surgery," and "The Management of Common Ocular Injuries," Dr. William B. Clark; "Vascular Lesions of the Ocular Adnexa," and "Vascular Lesions of the Globe," Dr. Banks Anderson.

On the concluding day, the following program was presented: "Recent Advances in Ocular Therapeutics," Dr. Harold F. Falls; "Applied Physiologic Optics," Charles Sheard, Ph.D.; "The Familial Corneal Dystrophies," Dr. William B. Clark; "Ocular Manifestations of Dermatological Disease," Dr. Banks Anderson; "Clinical Manifestations of Involvement of the Visual Pathway," Dr. John W. Henderson; and "Surgical Anatomy of Operations for Glaucoma," (movies) Dr. F. Bruce Fralick.

REFRESHER SYMPOSIUM

During the four-week period, April 26th through May 22nd, a full-time refresher symposium in ophthalmology is being given to eight qualified ophthalmologists by the ophthalmologic and medical staffs of the Mount Sinai Hospital in affiliation with Columbia University. This symposium is designed to be an intensive review of modern concepts in the field and consists of clinical, laboratory, and didactic instruction in pathology, embryology, bacteriology, optics, surgery, ophthalmoscopy, and so forth.

SOCIETIES

WINS ADVERTISING AWARD

At the first quarterly meeting of the Better Vision Institute, Inc., Pres. M. J. Julian displayed the medal won by the Institute in the annual advertising awards for 1947. This was the highest honor given in the classification of association advertising.

BROOKLYN PROGRAM

The 104th regular meeting of the Brooklyn Ophthalmological Society was held at the Brooklyn

Eye and Ear Hospital on April 15th. Case presentations on the scientific program included: "Stevens-Johnsons Disease," Dr. Julius M. Dan; "Coloboma Iris, Choroid, and Optic Nerve," Dr. A. B. Rizzuti; "Boeck's Sarcoid of the Orbit," Dr. Martin Bodian; "Spontaneous Dislocation of the Lens," Dr. Charles Stern, *(By Invitation);* "Ciliary Staphyloma," Dr. Jerome Samuel, *(By Invitation);* "Subchoroidal Hemorrhage Complicating Intraocular Surgery," Dr. Leo Esbin, *(By Invitation);* "Herpes Zoster Ophthalmicus," Dr. Mortimer Cholst, *(By Invitation);* "Aniridia In Three Generations," Dr. Israel Gerberg.

University of Glasgow Meetings

During the month of May a series of meetings will be held in the Department of Ophthalmology, University of Glasgow, on Wednesdays at 8 p.m. The general arrangements will be similar to the series held last year. Tea will be served after the paper and a discussion will follow. The meetings will be open to all medical practitioners and senior students interested in ophthalmology. On May 5, Dr. I. C. Michaelson will present "The Growth of Ocular Vessels;" May 12, Dr. James Hill, "Disturbances of Lacrimal Apparatus;" May 17, Dr. W. O. G. Taylor, "Wounds of the Cornea;" May 26, Mr. O. M. Duthie, "Cataract Extraction."

Oxford Congress

The next meeting of the Oxford Ophthalmological Congress had been arranged for Thursday, Friday, and Saturday, July 8th, 9th, and 10th, at the School of Geography, Mansfield Road, Oxford.

The congress will be opened by a discussion on "The Use and Abuse of Topical Ocular Therapy," and will be led by Mr. Frederick Ridley, Dr. J. R. Robson (pharmacology), and Dr. F. E. Preston.

The Doyne Memorial Lecture will be delivered by Sir Stewart Duke-Elder and will be entitled "The Blood Aqueous Barrier."

Round-table conference

The annual round-table conference of the New York Society for Clinical Ophthalmology was held on April 5th. The subject for discussion was "Nonsurgical Therapy in Ophthalmology." On the panel of discussors were: Dr. Irving H. Leopold, Philadelphia; Dr. Parker Heath, Boston; Dr. Ludwig von Sallmann, New York; and Dr. Derrick Vail, Chicago. Dr. Daniel Kravitz, president of the society, acted as moderator.

Milwaukee society

The regular meeting of the Milwaukee Otoophthalmic Society was held on March 23rd. "Tumors of Ciliary Body: A Case Report," was presented by Dr. M. Kadin, as a membership thesis.

Los Angeles officers

The Los Angeles Society of Ophthalmology and Otolaryngology has elected the following officers for 1948: president, Dr. Colby Hall; secretary-treasurer, Dr. Warren A. Wilson; chairman of section on ophthalmology, Dr. John A. Bullis; secretary of section on ophthalmology, Dr. Rodman Irvine; chairman of section on otolaryngology, Dr. Leland G. Hunnicutt; secretary of section on otolaryngology, Dr. Alden H. Miller.

The Los Angeles County Medical Association Building, 1925 Wilshire Boulevard, Los Angeles, is the place of meeting, and the time is 6 P.M. the fourth Monday of each month from September to May, inclusive.

N.S.P.B. appoints nursing consultant

The National Society for the Prevention of Blindness announces the appointment of Helen E. Weaver, R.N., as consultant in nursing activities. Miss Weaver comes to her position from the New York State Department of Health where she was consultant public health nurse of the Division of Venereal Disease Control.

United Kingdom society meets

The annual congress of the Ophthalmological Society of the United Kingdom was held on April 8th, 9th, and 10th at the Royal Society of Medicine, London. Dr. A. J. Ballantyne, president, gave the welcoming address. Others participating in the program were: Prof. H. Cohen, Dr. Denis Williams, and Mr. J. H. Doggart, who presented "Subjective Disorders of Vision;" Dr. Helen Dimsdale and Mr. D. G. Phillips, "Ocular Palsies Due to Infection of the Nasal Sinuses;" Mr. J. P. F. Lloyd, "A Preliminary Survey of 45 Consecutive Cases of Congestive Glaucoma;" Mr. Eugene Wolff, "The Conjunctival Nevus and the Neurogenic Theory of Melanomas;" Dr. H. M. Traquair, "Pictorial Demonstrations;" Prof. Marc Amsler, "New Clinical Aspects of the Vegetative Eye" (The Bowman Lecture); Dr. T. L. Thomassen, "The Venous Pressure in Glaucomatous Eyes;" Dr. G. I. Scott, "Some Observations on Clinical Perimetry;" Mr. G. T. W. Cashell, "Two Case Presentations—Subconjunctival Rupture of the Globe with Extensive Migration of Uveal Pigment, and an Aneurysmal Varix of the Retina;" Mr. A. G. Cross, "Papilledema in Association with Toxic Hydrocephalus;" Mr. T. Keith Lyle, "Latent Nystagmus;" Prof. Arnold Sorsby, "The Classification of the Unassociated Dystrophies of the Fundus;" Dr. J. Ellison, "Pictorial Demonstrations;" Mr. C. Dee Shapland, "Prognosis in Detachment of the Retina;" Dr. I. C. Michaelson, "The Mode of Development of the Vascular System of the Retina, with Some Observations on Its Significance for Certain Retinal Diseases;" Prof. W. H. Melanowski, "Atropin in the Treatment of Glaucomatous Iridocyclitis;" Dr. W. C. Souter, "Auto-Eversion of Upper Lid, Voluntary, Unaided."

New York society officers

Newly elected officers of New York Society for Clinical Ophthalmology for the year 1948-1949, are:

president, Dr. Benjamin Esterman; vice-president, Dr. Sidney A. Fox; recording secretary, Dr. Bernard Kronenberg; corresponding secretary, Dr. Leon H. Ehrlich; treasurer, Dr. Edward Saskin; historian, Dr. Howard J. Agatston. Committee chairmen are: program, Dr. Adolph Posner; instruction hour, Dr. Frederick H. Theodore; legislative, Dr. Max Chamlin; membership, Dr. Bernard Fread; industrial, Dr. David A. Newman. Dr. Daniel Kravitz, the retiring president, was elected to the advisory council.

Journal club organized

A meeting was held at the home of Dr. Samuel V. Abraham, 610 North Linden Drive, Beverly Hills, California on April 15, for the purpose of organizing the Ophthalmological Journal Club.

The primary interest of the club is to abstract current literature on ophthalmology and related subjects for the purpose of presenting it to the members for discussion.

The meetings will be held the first Thursday of each month at 8 P.M., at 416 Bedford Drive, Beverly Hills. Dr. Samuel V. Abraham is chairman of the club.

Personals

Retires because of ill health

Dr. Frank R. Slopanskey, Salt Lake City, Utah, has recently retired because of ill health after 42 years of active medical and surgical practice.

Will tour European area

Dr. Harold Scheie, associate professor of ophthalmology at the University of Pennsylvania and chief of the eye service at the University of Pennsylvania Hospital, will visit the United States Army hospitals in the European area under the program whereby a team of civilian medical consultants spend several days at each hospital advising the theater surgeon and hospital staffs in the treatment of their patients.

To conduct clinics

Dr. Albert D. Ruedemann, professor of ophthalmology, Wayne University College of Medicine, Detroit, is conducting clinics on beta irradiation in ophthalmology at the City of Detroit Receiving Hospital from 10 a.m. to noon every other Wednesday until June.

Gives lectures

On February 13, 1948, Dr. Joseph I. Pascal gave a lecture to the graduate class in ophthalmology of the Harvard Medical School on "A Graphic Study of Ocular Muscles." The same subject was presented by Dr. Pascal at the March 4th meeting of the Eastern New York Eye, Ear, Nose, and Throat Association in Albany, New York, and at the March 8th meeting of the Passaic-Bergen Ophthalmological Club.

Awarded medal

The Richard Pearson Strong medal for distinguished and outstanding work in tropical medicine has been presented to Dr. Neil P. Macphail, medical superintendent, East Coast Division, United Fruit Company, Quirigua, Guatemala, for a lifetime of service devoted to tropical medicine in Central America.

Resigns hospital appointment

On April 1, 1948, Dr. John N. Evans resigned as Ophthalmologist-in-Chief of Long Island College Hospital, and has been appointed Consultant to the Department of Ophthalmology.

Colorado consulting ophthalmologist

Dr. John C. Long has been appointed as consulting ophthalmologist to the State of Colorado under the Aid to the Blind law, in place of Dr. William H. Crisp (resigned).

Announcement

The 20th semiannual conference in "Neuromuscular Anomalies of the Eyes," will be held at The Children's Memorial Hospital, Chicago, Illinois, by Dr. George P. Guibor on June 13 to 18. The class will be limited and no applications will be accepted after June 8. Lectures and Demonstrations will be at the Hospital, Entrance 700 Fullerton Avenue. The tuition is $50.00; $25.00 payable on enrollment, balance payable on registration. All correspondence and checks should be addressed to The Children's Memorial Hospital.